



STATEMENT OF WORKS

Design and build for the repairs of the
vehicle bridges and culverts at Camp
Santiago Joint Training Center
Salinas, Puerto Rico

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PART 1

GENERAL INFORMATION

1.1 ACRONYMOUS

1.2 DEFINITIONS

1.3 BACKGROUND

1.4 DESCRIPTION

1.5 PERFORMANCE PERIOD

1.6 FUNDS

PART 1: GENERAL INFORMATION

1.1 ACRONYMOUS

AR Army Regulations

ASG Administración de Servicios Generales

AT/OPSEC Antiterrorism/Operational Security Background Investigation

CFMO Construction and Facilities Management Office

CFR Code Federal Regulation

COR Contracting Officer Representative

DA Department of the Army

DD254 Department of Defense Contract Security Classification Specification

DFARS Defense Federal Acquisition Regulation Supplement

DoD Department of Defense

EPA Environmental Protection Agency

FAR Federal Acquisition Regulation

NIOSH National Institute for Occupational Safety and Health

NGB National Guard Bureau

OSHA Occupational Safety and Health Agency

POC Point of Contact

PPE Personal Protective Equipment

PRARNG Puerto Rico Army National Guard

RUL Registro Unico de Licitadores

SAM System for Award Management

US United States

1.2 DEFINITIONS

Change Order - A written order issued by the PRARNG, or its duly authorized representative, to the Contractor, signed by both parties, covering, additions, deletions, and/or revisions in the Work and/or an adjustment in the Contract Price and/or the Contract Time, if any, issued on or after the Effective Date of the Contract. In Unit Price Contracts, a Change Order can also reflect a change in the number of items, as well as an increase or decrease, contained in the proposal. In Lump Sum Contracts, it reflects an order for additional or less work.

Contract - a written agreement, especially concerning with detailed services herein in this document.

Contractor - is an individual or entity that conducts business and is duly organize under the laws of the Government of Puerto Rico or foreign commercial organizations authorized to do business in Puerto Rico, registered in “Registro Unico de Licitadores” under the Puerto Rico General Services Administration (ASG), with: Unique Entity Identifier, CAGE Number and be active in SAM Registry. It will be who be select to perform the services and works described in this request.

Days - this term will be considered as calendar days.

Government - means Government of Puerto Rico, it is inclusive but not limited to other branches, municipalities and instrumentalities that administer Puerto Rico.

PRARNG – means Puerto Rico Army National Guard.

Project Schedule - A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Work within the Contract Time.

Subcontractor - A Subcontractor is an individual or entity that has a direct contract with the Contractor to perform any of the Work at the Site. The term Subcontractor as referred throughout the Purchase Order Documents means the Subcontractor or his authorized representative.

1.3 BACKGROUND

On September 18, 2022, Hurricane Fiona passed through the island of Puerto Rico, causing damage to the facilities of the Puerto Rico National Guard and affecting the operation carried out at the Camp Santiago Joint Training Center (CSJTC). These damages directly affected the bridges that provide access to military vehicles in various areas of CSJTC.

1.4 DESCRIPTION

This project consists in the repair to the existing Puerto Rico Army National Guard Vehicle Bridges and Culverts located at the CSJTC, Salinas, Puerto Rico. This project will repair storm damage caused by Hurricanes Fiona at seven sites on 4 different roads in CSJTC. Assessments performed post the emergency serve as a guide to the damages that occurred as a consequence to the storm. The purpose of the repairs is to obtain a fully functional structure to carry vehicular traffic on the training site.

1.5 PERFORMANCE PERIOD

Contractor will develop the activities indicated in the scope of work in a term of 32 months.

1.6 FUNDS

Appropriation funds for the project are 100% Federal.

PART 2

COST PROPOSAL CONSIDERATION

2.1 SCOPE

2.2 CONDITIONS

2.2.1 UNIFORM GENERAL CONDITIONS FOR PUBLIC WORKS CONTRACT IN PUERTO RICO

2.2.2 ADDITIONAL PROVISIONS

2.2.3 CONTRACT FEDERAL CLAUSES

2.2.4 IMPERATIVE INCLUSION CLAUSES

2.2.5 SECURITY AND PROTECTION REQUIREMENTS

2.2.5.1 Anti-Terrorism/Force Protection

2.2.5.2 iWATCH

2.2.5.3 TARP

2.1

SCOPE OF WORKS



**“DESIGN AND BUILD FOR THE REPAIRS OF THE VEHICLE
BRIDGES AND CULVERTS AT
CAMP SANTIAGO JOINT TRAINING CENTER (HURRICANE FIONA)”
SALINAS, PUERTO RICO**

PREPARED BY:

DESIGN AND PROJECT MANAGEMENT BRANCH SECTION

DATE: 18 APRIL 2023

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Preface:

This Scope of Works (SOW) consists of 3 parts.

Part 1 lists the project requirements, background project information, specific scope items, and expected quality level above and references beyond those outlined in Part 2.

Part 2 contains project specific information for each site.

Part 3 contains the list of Attachments.

PART 1 STATEMENT OF WORK

1.0 PROJECT DESCRIPTION

- A. **OVERVIEW:** The Puerto Rico Army National Guard (PRARNG) shall contract the services of a design build company capable of complying with the standards set forth in order to responsibly submit a proposal for the rehabilitation improvements. The Contractor shall evaluate provided assessments, to produce technical data and construct the repair works necessary to obtain a fully functional structure.
1. Design services shall include the validation of assessments, prepare as-built plans of damaged conditions, and prepare technical data and construction plans.
 2. Construction shall include Storm Damage Repairs to Vehicle Bridges, Roadways, Culverts, in the priority order established in the proposal form.
- B. **BACKGROUND:** The purpose of this project is to repair damages caused by Hurricane Fiona (18 September 2022), to the existing Puerto Rico Army National Guard Vehicle Bridges and Culverts located at the Camp Santiago Joint Training Center (CSJTC), Salinas, Puerto Rico. This project will repair storm damage caused by Hurricanes Fiona at seven sites on 4 different roads in CSJTC, refer **Part 2.1** for site locations. Assessments performed post the emergency serve as a guide to the damages that occurred as a consequence to the storm. The purpose of the repairs is to obtain a fully functional structure to carry vehicular traffic on the training site.
- C. **LOCATION:**

Location of each site inside Camp Santiago:

Site	Component	PRNG #	ID Number	Location
1	Vehicle Bridge	432314	FAC# 00987	18.00535, -66.30431
2	Drainage Ditch	432316	FAC# DD021	17.996981, -66.28973
3	Drainage Ditch	432317	FAC# DD020	17.994047, -66.29267
4	Vehicle Bridge	432318	FAC# 85120	18.012841, -66.27942
5	Vehicle Bridge	432319	FAC# 02021	18.0247422, -66.2616
6	Vehicle Bridge	432320	FAC# 00070	18.019159, -66.33072
7	Vehicle Bridge	432315	FAC# D011	18.005553, -66.30082

1.1 PROJECT OBJECTIVES

- A. **DESIGN OBJECTIVES:**
1. Consult US Army Corps of Engineers for any permit regulatory requirements.
 2. Vehicle Bridges, roadways and culvert geometric design.
 3. Comply with traffic safety standards within the project limits (guardrails, medium barriers, etc.)
 4. Survey and mapping
 5. Limit project boundary

6. Geotechnical and pavement investigation, analysis, and design for roadway excavation and embankments, cut and fill slope stability, retaining walls, temporary and permanent pavements, major culverts, etc.
7. Preparation of a Geotechnical and Pavement Report shall de recommendations for earthwork, containment berms, pavement sections, structure foundations, slabs on grade (including subgrade modulus for slab design), sheeting and shoring (if required), dewatering (if required), retaining walls (if required), and storm water retention construction that will be utilized in development of the design and construction documents.
8. Hydrologic and Hydraulic analysis and design for culverts, inlets, storm sewer systems, ditch capacity and stability, scour protection at drainage outfalls, etc.
9. Permanent and temporary pavement marking
10. Provide signage for bridge with name and capacity.
11. Development of a Transportation Management Plan, including preparation of Traffic Control Plans for all phases of construction. Identify staging areas and haul routes.
12. Landscaping design for re-establishment of vegetation affected by construction.
13. Soil erosion and sediment control design for all phases of construction, including preparation of a Storm Water Pollution Prevention Plan (SWPPP) for each site.
14. Preparation of plans and specifications, preparation and coordination of submittals for review, and resolution of comments.
15. Development and implementation of a Quality Management Program for design.
16. Preparation and coordination of submittals for review, resolution of comments, and obtaining all required permits for construction of the project.
17. Community and Stakeholder involvement and coordination, including documentation of meetings.
18. Design documentation (record drawings and as-built plans).
19. Preparation of shop drawings during construction.

B. CONSTRUCTION OBJECTIVES: Contractor shall provide design and construction for the following general repairs that shall be considered in each facility. Refer to Part 4, Technical Specifications for additional instructions and compliance:

1. Demolition/Disposal as per project scope. Dispose all construction debris out of the CSJTC property at an approved landfill. Submit evidence.
2. Demolition and removal of structures and obstructions within the construction limits.
3. Site work; earth work; clearing and grubbing; grading
4. Construction of bridges, drainage systems including culverts, storm drains, inlets, headwalls, curb and gutter, paved waterways, scour protection measures, and other drainage structures.
5. Installation of safety measurements.
6. Installation and maintenance of temporary erosion and sediment control measures, including management of soil stockpiles within the project limits.
7. Maintenance of public traffic through work zones. This includes construction of temporary access, and placement temporary pavement markings, construction signs, barriers, and other traffic control devices.

8. Obtaining all permits for construction, and implementing permit requirements.
 9. Compliance with the environmental regulations.
 10. Development and implementation of a Quality Management Plan for construction. The Quality Management Plan includes, but is not limited, to providing independent construction inspection services, performing material testing, and providing product warranties.
 11. Project administration, management, and scheduling.
 12. Preparation of construction plan revision submittals.
 13. Preparation of as-built plans, including completion of an as-built survey of the finished work.
- C. **PARTNERING:** The COR will organize initial and follow-up informal partnering sessions with key personnel of the project team, including Contractor's A/E and Construction Team and Government personnel. The initial session shall be an in person Post Award Kick off meeting (PAK Meeting). Follow-on partnering sessions will be conducted every month or less frequent as determined by the Contracting Officer.

1.2 APPLICABLE CODES AND STANDARDS

A. **APPLICABILITY:** The design and construction must be in accordance with the latest revision/edition of the following referenced codes and standards. The term "Latest Revision/Edition" is defined as the version as of the project award date. Repair and replacement projects shall be evaluated on an individual basis.

B. **CODES AND REGULATIONS:**

1. NGB DG 415-5, Army National Guard General Facilities Information Design Guide, (1 JUNE 2011)
2. UFC 3-310-08 (17JULY 08) Non Expeditionary Bridge Inspection & Repair
3. International Building Code, 2019
4. Puerto Rico Building Code, 2019
5. AISC M018 & M019, American Institute of Steel Construction Steel Construction Manual, Manual of Steel Construction Load & Resistance Factor Design - Volume I Structural Members, Specifications, & Codes; Volume II Connections.
6. ASSE 1264.1, American Society of Safety Engineers, Safety requirements for workplace floor and wall openings, stairs and railing systems.
7. ASCE 7-98, American Society of Civil Engineers, Minimum design loads for buildings and other structures.
8. ASTM, American Society for Testing and Materials.
9. AWS, American Welding Society.
10. ASME, American society of mechanical engineers.
11. NEC, National electric code,
12. Occupation Safety and Health Administration (OSHA) Safety and Health Standards (29 CFR 1910).
13. Local, state, and other codes as applicable (verify with Puerto Rico Army National Guard).
14. Federal Highway Codes and Regulations
15. AASHTO Codes and Regulations

C. **SUSTAINABILITY AND ENERGY EFFICIENT GUIDELINES**

1. Executive Order (E.O.) 13514, "Federal Leadership in Environmental, Energy and Economic Performance. The E.O. states that it is "the policy of the United States that Federal agencies shall increase energy efficiency; measure, report, and reduce their green house gas emissions from direct and indirect activities; conserve and protect water resources through efficiency, reuse, and storm water management; eliminate waste, recycle, and prevent pollution; (and) strengthen the vitality and livability of the communities in which federal facilities are located.
2. LEED-No LEED Certification is required for this project.

1.3 GENERAL PROJECT GUIDELINES

A. CONSTRUCTION: Site Demolition shall occur in a sequential and coordinated matter. Coordination with the facility manager and COR must be discussed in the preconstruction conference on site.

1. Contractor shall selectively demolish items to be replaced.
2. Contractor is further responsible for a safe, fully functioning structure that complies with the regulations stated above.

B. SECURITY REQUIREMENTS: All security requirements apply to all subcontractors and suppliers associated with this contract. Comply with the following:

1. Do not publicly disclose any information concerning any aspect of the materials or services relating to this contract, without prior written approval of the Contracting Officer.
2. Do not disclose or cause to be disseminated any information concerning the operations of the activity's security or interrupt the continuity of its operations.
3. Do not disclose any information to any person not entitled to receive it. Failure to safeguard any classified information that may come to the Contractor or any person under his control, may subject the Contractor, his agents or employees to criminal liability under 18 U.S.C., Sections 793 and 798.
4. Direct to the Contracting Officer and or Installation Security Officer for resolution all inquiries, comments or complaints arising from any matter observed, experienced, or learned as a result of or in connection with the performance of this contract, the resolution of which may require the dissemination of official information.
5. Coordinate photography requirements with the Contracting Officer. Some areas restrict or prohibit photographing Government property.
6. Deviations from or violations of any of the provisions of this paragraph, will, in addition to all other criminal and civil remedies provided by law, subject the Contractor to immediate termination for default and withdrawal of the Government's acceptance and approval of employment of the individuals involved.

C. WORK HOURS, ACCESS AND PASSES: All Contractor employees, including subcontractors, subcontractors' employees, suppliers, and suppliers' employees are required to comply with the Installation Security Requirements regarding personnel, vehicle, and equipment security passes and access the jobsite.

1. Nothing in the contract is to be construed in any way to limit the authority of the Commanding Officer to prescribe new, or to enforce existing security regulations governing the admission or exclusion of persons and the conduct of persons while aboard the station, including but not limited to, the rights of search of all persons or vehicles aboard the station.
2. Coordinate with the Contracting Officer for specific security and access requirements.

3. Working Hours shall be from 7:00am to 4:00pm, Monday thru Friday. Special accommodation might be considered for special activities with prior coordination.

1.4 EXISTING SITE CONDITIONS

- A. **EXISTING CONDITION:** Refer to Part 2.1.
- B. **ASSESSMENT SUMMARY:** Refer to Part 2.2 for a report of site repairs to be included in this proposal. Contractor shall visit and verify existing site conditions and all existing utilities that may include water lines, sanitary gravity sewer main, sanitary pump station, sanitary force main, storm sewer, overhead electric and underground telephone.
- C. **PROJECT COST:** The proposal shall be based on National Guard standard percentage fees as per regulations. Refer to proposal cost form Part 3.1.
 - **Total construction budget for these works is estimated at: \$9,750,000.**
- D. Estimated design and construction period of performance: **32 months.**

1.5 DESIGN PHASES

- A. **ENGINEERING SERVICES:** Field services and investigations – Contractor must complete all required field study and/or investigation required to complete the design and construction phase of the proposed action. Services included, but not limited to, are the following:
 1. Survey and topography - The A/E will subcontract with a registered professional land surveyor (must be certified and registered at “*Colegio de Ingenieros y Agrimensores de Puerto Rico*”) to prepare an existing features/topographic and boundary land survey for the project site. Determination of utility locations and capabilities – Contractor must identify in field all primary and secondary utilities to which future connections will be done. If required.
 2. Hydrology and Hydraulic Study- The A/E will subcontract a registered professional to prepare a certified report.
 3. Soil borings - The A/E will retain a geotechnical subcontractor to characterize the existing subgrade and soil conditions on the preferred site by drilling geotechnical borings, taking samples, developing boring logs, and providing a geotechnical report of findings. The geotechnical subcontractor report will include recommendations for earthwork, containment berms, pavement sections, building foundations, slabs on grade (including subgrade modulus for slab design), sheeting and shoring (if required), dewatering (if required), retaining walls (if required), and storm water retention

construction that will be utilized in development of the design and construction documents.

4. Programming design charrette (10%): A/E shall make all necessary preparations for and facilitate a detailed planning. A charrette will be held to reach a consensus on an overall initial site development layout and conceptual building/structure floor plan for the project. The submission shall be brief and schematic in nature with enough data to describe the project in a narrative covering each engineering discipline. The CFMO, COR and user representatives should be present during the charrette. The findings from the charrette will be documented in meeting minutes. The details obtained during the charrette will also be provided in the Preliminary Design package as per project schedule.
5. Environmental and Construction Permits – Designer is responsible to obtain information necessary to prepare, submit and obtain required permits and endorsements. PRARNG will provide any authorization, property information and any documentation needed to obtain the required permits and endorsements.
 - a. PUI- Stormwater Pollution Prevention plan (CES)
6. Information for all applicable endorsements and all required permitting process for the construction of the proposed action, from Federal, State and Municipal agencies/offices. Compliance with Environmental Policy, law 416 of September 22, 2004 (as amended) will be provided by PRARNG.

B. CONCEPT DESIGN STAGE (30%) - The primary goal during this phase is to refine and finalize the design concept and develop the Design Development package. All major structures systems and components will be evaluated, selected, and established in this phase. The major design decisions will be made during this phase of the work with the resolution of details required to produce clear documents for construction still open. No significant design changes are anticipated beyond this design phase.

1. Meeting: After submission of the Preliminary Design package, upon review by the PRARNG representatives, a design review meeting shall be coordinated.
2. Plans: The A/E shall develop and submit preliminary plans with sufficient detail and data to adequately depict the basic repair and restore features. Preliminary Plans (for all applied disciplines) will be developed with emphasis on layouts and proposed major system arrangements and distribution in lieu of details. At a minimum, the Preliminary Plans shall include the following:
 1. Location Map related to the north point at a larger scale than the vicinity sketch, it provides information on existing conditions adjacent to the property on which the project is located. The map identifies all existing major structures in the neighborhood, including names of roads, streets, etc.
 2. Site Plan that includes the following:

- i. Property boundaries, streets, and the general area surrounding the site, to include streams, rivers, lakes, wetlands, flood plains, etc.
- ii. Base line and location of the proposed structure.
- iii. Both original and proposed finished grades within the construction area, either by spot elevations or by contour. However, they must be of sufficient number of intervals of contour to adequately show the intended concept and magnitude of grading being proposed for the project. Outside of the construction area, sufficient data should be provided to show the general topography in relation to the proposed construction work.
- iv. Existing and proposed site supporting items such as rigid and flexible paving (i.e. sidewalks, parking, roads to include curbing, service/access aprons), fencing, etc.
- v. Location of existing and proposed utility lines to include water, sanitary sewer, storm drainage, telecommunications, electrical, etc., and connection with existing utility systems.
- vi. Show all actual designed quantities of grading and seeding, paving and fencing, extension of utilities, roads, and sidewalks. As an alternative, the A/E may include this information in the supporting design data, the cost estimate, or the preliminary design specifications, and in a format that as is standard to the A/E.
- vii. Location of any historic, archeological, or environmental sensitive areas on the site. The Contractor should consider the preparation of a report to present (SHPO) for the evaluation of the design proposal. In accordance with Secretary of the Interior's Standards for the Treatment of Historic Properties.

3. Existing Plans (existing geometric plan and proposed design)

3. Specifications - Contractor shall submit an outline of the technical sections to be included in the final specifications. The outline shall convey enough information to support the design intent and cost estimate that the Contractor is proposing. Outline specifications means that the specified item or equipment must convey enough information to support in Master format the design intent and cost estimate.
 - a. Each specification section should include a brief description of each system or piece of equipment being used.

- b. The contractor shall list any substitutions of items or finishes that are being proposed. Specifically identify any proposed use of a proprietary or sole-source item. Sufficiently detail the reasons and justification to demonstrate why the item uniquely satisfies a project requirement.
4. Revised cost estimate - The Contractor shall provide a cost estimate with costs broken down by architectural and engineering disciplines.
5. Submittal Log: Contractor shall provide complete submittal log for evaluation and approval.

C. PRELIMINARY DESIGN STAGE (60%): Based on the comment resolutions and decisions reached at the Concept Design Review Conference, the Contractor will prepare an 'Interim Progress' of design between Concept (30%) and pre final (90%) for a design review meeting with PRARNG along with the Contractor Design Team. Design documents at this stage shall sufficiently depict repair and restoration patching works for the Contractor to commence construction upon the approval of permits. This review set will, at a minimum, consist of the following:

1. Plans - CADD drawing plans for all disciplines that represent midpoint level design efforts.
2. Construction specifications
3. Ready For Construction (RFC) Submittals: Contractor shall submit for approval all submittals required for construction.
4. Revised cost estimate - The Contractor shall provide a cost estimate with costs broken down by architectural and engineering disciplines.
5. Updated Project schedule
6. Permits: At this stage, permits for the repair shall be obtained.

D. PRE-FINAL (90%) This phase will take the drawings from the concept and preliminary design submittal to complete the details required to produce a final set of design documents for Construction.

1. Meeting – The Contractor will host and attend regular scheduled meetings between the Contracting Office and PRARNG designated personnel. The Contractor will initiate and document these meetings. Key personnel, such as design leads and project manager, will attend to discuss and resolve design progress and issues. Meeting minutes will be documented, published, and distributed within 7 business days after the meeting by the Contractor and will serve as the progress reports for the project. After submission of the Pre-Final

(90%) design package, and upon completion of the review by the PRARNG (CFMO), end users and other review entities as may be required, an on-site review meeting.

2. Plans - The Contractor shall submit final plans separated into titled sections by architectural and engineering discipline.
3. Specifications - The submission shall incorporate a clear and accurate description of the technical requirements of the material of product required in the completed project. The description may include a statement of the qualitative nature of the material or project specified or, when necessary, may set forth those minimum essential characteristics and standards to which it must conform if it is to satisfy its intended use.

E. Final Documents for Construction 100% - Consultant shall accomplish the following:

- a. Submit a certified set of plans and technical specifications "Issue for Construction" as specified in the submittal schedule.
- b. Final drawings must be certified by an licensed Architect or Engineer to practice within the Commonwealth of Puerto Rico (the Final 100% drawings shall be signed and sealed).
- c. The 100% shall include the necessary plans, elevations, sections, schedules, and notes prepared in sufficient detail to assure:
 - i. Complete depict the construction of all elements.
 - ii. Coordination of drawings and specifications to eliminate omission, conflicts, or ambiguities.

1.6 CONSTRUCTION Contractor shall provide the necessary personnel to assure the PRARNG and its Project Manager that the Work is performed in a satisfactory manner as pertains to the correct interpretation of the plans and technical specifications.

1. Project Management:
 - a. The Contractor Project Manager (CPM) shall coordinate and oversee all aspects of the project.
 - b. The Contractors designated CPM and/or design project manager (DPM) shall attend all scheduled Construction Project progress meetings. Site visits (coordinated upon award and as requested by the Project Manager to the construction) shall be made by the Design supervisor to observe and file reports on the progress and quality of the work performed under the construction contract.
 - c. Prepare, revise, and submit Contractor payments.
 - d. Observe and assist in the performance test and initial operation of the Construction Project.
2. Construction Inspection and Supervision– Contractor shall perform all services in compliance with the contract documents and in accordance with this SOW scope of services.

1. Period of performance to be determined by the estimated construction duration.
 2. Provide the services of a licensed architect and/or engineer including the necessary staff to provide assurance to PRARNG and its Project Manager that the Work is performed in a satisfactory manner as pertains to the correct interpretation of the plans and technical specifications.
 3. The Consultant's shall attend all scheduled Construction Project progress meetings.
 4. Site visits (coordinated upon award and as requested by the Project Manager) to the construction shall be made by the Consultants and file reports on the progress and quality of the work performed under the construction contract.
 5. Provide the support services of a contractor design team to assist in the construction phase. Attend issues as needed based on issues concerning the original plans and specifications or any other minor changes that may arise during the construction.
 6. Review the compliance with design concepts and contract documents, revise all request for information (RFI), submittals, shop and erection drawings, laboratory reports, samples, test reports and other documents.
 7. Provide technical solutions and prepare sketches required to resolve problems due to actual fields conditions encountered.
 8. Provide clarifications or interpretation of the contract design documents.
 9. Review and comment on request for modifications that is originated by the Construction Project Contractor.
 - a. If necessary, review and comment on request payments submitted by the Construction Contractor.
 - b. Observe and assist in the performance test and initial operation of the Construction Project.
 - c. Review and comment on request by the construction Contractor for a declaration of substantial completion.
 - d. Help inspector revise punch list corrections required from the Construction Project Contractor and recommend Inspector and Project Manager compliance with punch list items.
 - e. Make project visits and file report on substantial completion of the Construction Project including, if necessary, recommendations concerning final payment and release of retainer to General Contractor.
 - f. Make final visit and file report in order to certify completion of the Construction Project in accordance the contract documents as required or requested by the Project Manager.
3. Construction
- a. Contractor shall protect all surfaces and all existing areas to remain.
 - b. Structural components replaced during the construction shall comply with antiterrorism standards.
4. Construction Submittals:
- a. In addition to the design submittals noted in Section 01 33 10.05 20, construction

submittals will be required. The list of required submittals will be generated from the Contractor-prepared specifications and indicated in the submittal register.

- b. Shop drawing submissions will be governed by UFGS 01 33 00.05 20 Construction Submittal Procedures, available on the Whole Building Design website (www.wbdg.org). Contractor must assume a 15 day review period, and provide 3 hard copies of all submittals (in addition to electronic submittals) to be submitted to installation.

5. Meetings

- a. Pre-Construction Conference: Prior to construction or demolition, meet with representatives of the CFMO (Project Manager) to discuss and develop mutual understanding relative to administration of the safety programs, environmental issues, safety of building occupants and surrounding area, hazardous materials, waste disposal, construction QC procedures, construction schedule, labor provisions and other construction phase contract procedures.
- b. Progress Meetings: Weekly progress meetings shall be held to report on all of the aspects of the Project. Meeting minutes shall be generated by the contractor for record of such meetings.

1.8 SUBMITTALS

- A. Schedule: For each phase Contractor must follow the following table for documents requirements:

	Table A: Submittal schedule				
	Engineering Services 10%	Preliminary 30%	Advanced 60%	Construction 95%	Final 100%
Environmental Permits	X		X		X
Surveys as-builts	X				X
Auto Cad drawings		X	X	X	X
Cost breakdown			X		X
Permits - Endorsements	X (discuss)		Submit if applicable		
Technical specifications		X (outline)	X	X	X
Design & Construction Project schedule	X (design)		X (construction)		X (construction)

- A. Guidelines- The following guide must be followed by each submittal phase:

1. Submit design drawings or sketches, calculations and manufacturer's data to demonstrate compliance with contract requirements.
2. Provide hard and electronic copies of design submittal package to the PRARNG 21 calendar days to the in-progress review meeting. All hard copy submittals must be on minimum 30% postconsumer fiber paper, and, when 11x17 or smaller, double-sided. Contractor must submit two (2) full size, two (2) half sized and digital copies set of plans for each phase. ¹
4. The final design submittal must be professionally signed and sealed by the DOR and forwarded to the Contracting Officer prior to the start of construction. Separated final design packages will only be considered for Government review and approval during the Post Award Kick-off Meeting.
5. Auto Cad drawings must be in 2010 version or later. Drawings must be submitted in .dwg and .pdf format.
6. Cost estimate must be completed on a commercial spreadsheet application, such as Excel. Contractor must submit three (3) hard copies and digital copy for each phase (as requested on Table A).
7. Technical specifications must be submitted in paper and digital format. Two (2)

¹ Full size : 24" x 36"; Half size : 12" x 18".

copies must be submitted, in each format.

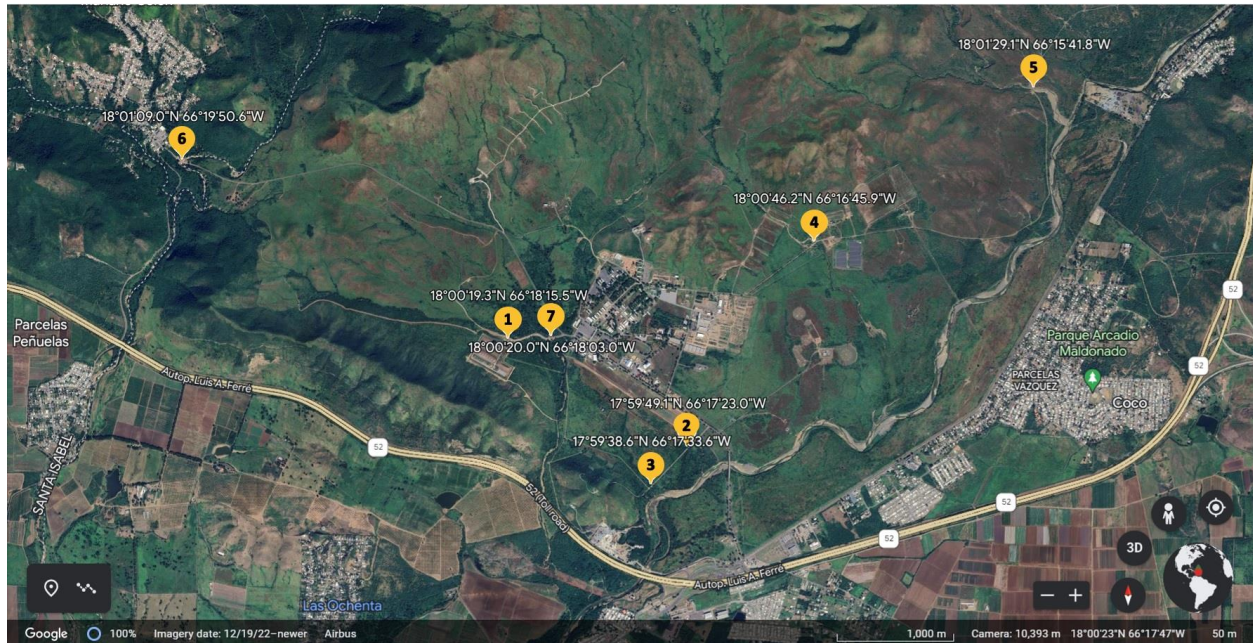
8. Project schedule must be completed using commercial schedule applications, such as Microsoft Project, Primavera, etc. Contractor must submit three (3) hard copies and digital copy for each phase (Refer to Table A).

9. Deliverable Schedule:

Deliverables Engineering and Design Services	Duration (calendar days)	Deliverables Construction	Duration (calendar days)
Notice to Proceed			
Program discussion	10		
Engineer services	60		
Programming Design Submission	30		
Programming Design Charrette	10		
Conceptual Submission 30%	45		
Conceptual Submission 30% - Charrette	10		
Preliminary Submission 60%	45		
Preliminary Submission 60% - Charrette	10	Permits Checklist appropriate Construction Activities	60 (permits) 10 (checklist run in parallel with permits)
Pre-Final Submission 90%	30		
Pre-Final Submission 60% - Charrette	10		
Final Submission	15	Construction Activities	650
		Contract Closeout	30

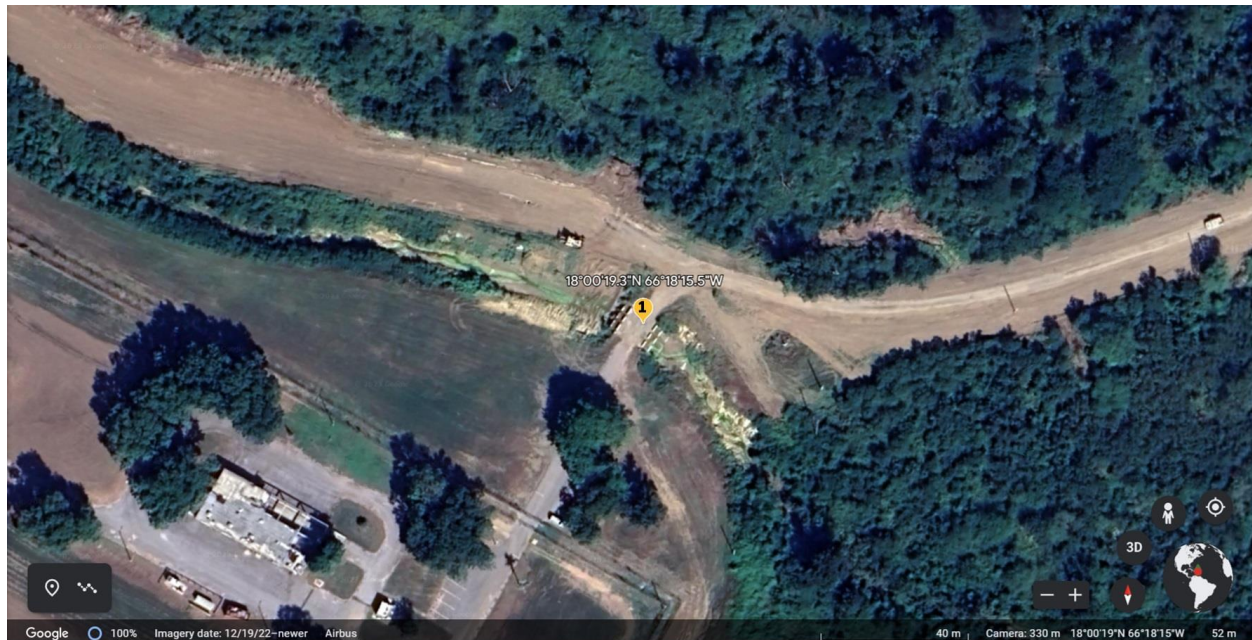
Part 2 Scope of Work

2.1 Location Plan and Photographs



SITE #1

Item	Project #	Description	Design SOW	Construction SOW
Site #1	432314	Vehicle Bridge in Road to ASP	1. As-Built indicating existing conditions	1. Repair one (1) wingwall upstream
			2. Design the repair of one (1) wingwall upstream	2. Construction of new wingwall upstream
			3. Design of new wingwall upstream	3. Mitigation of downstream river bed erosion near bridge
			4. Design mitigation measures downstream river bed erosion near bridge	4. Erosion control measures for river banks
			5. Design erosion control measures for river banks	5. River bed cleaning (100 MTS upstream and 50 MTS downstream)





Site #1



Site #1



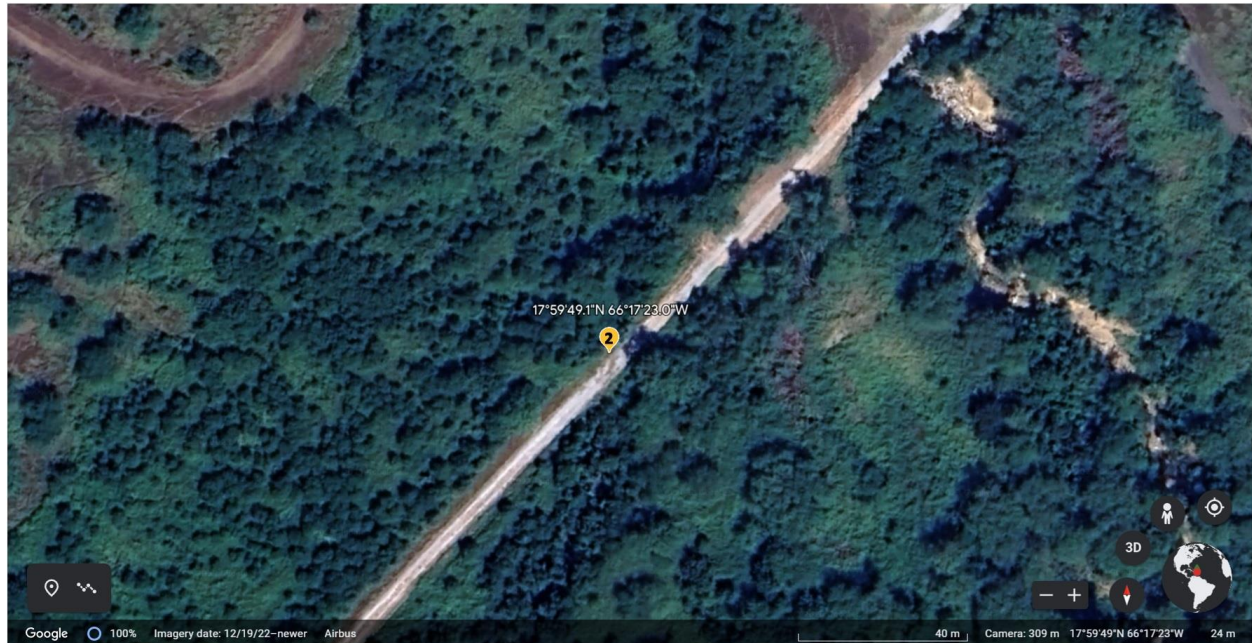
Site #1



Site #1

SITE #2

Site #2	432316	Drainage Ditch in Road to Cerro Modesto	1. As-Built indicating existing conditions	1. Erosion control measures for river banks
			2. Design erosion control measures for river banks	2. Guardrail replacement (approximately 110 LF)
				3. River bed cleaning (75 MTS upstream and 75 MTS downstream)





Site #2



Site #2



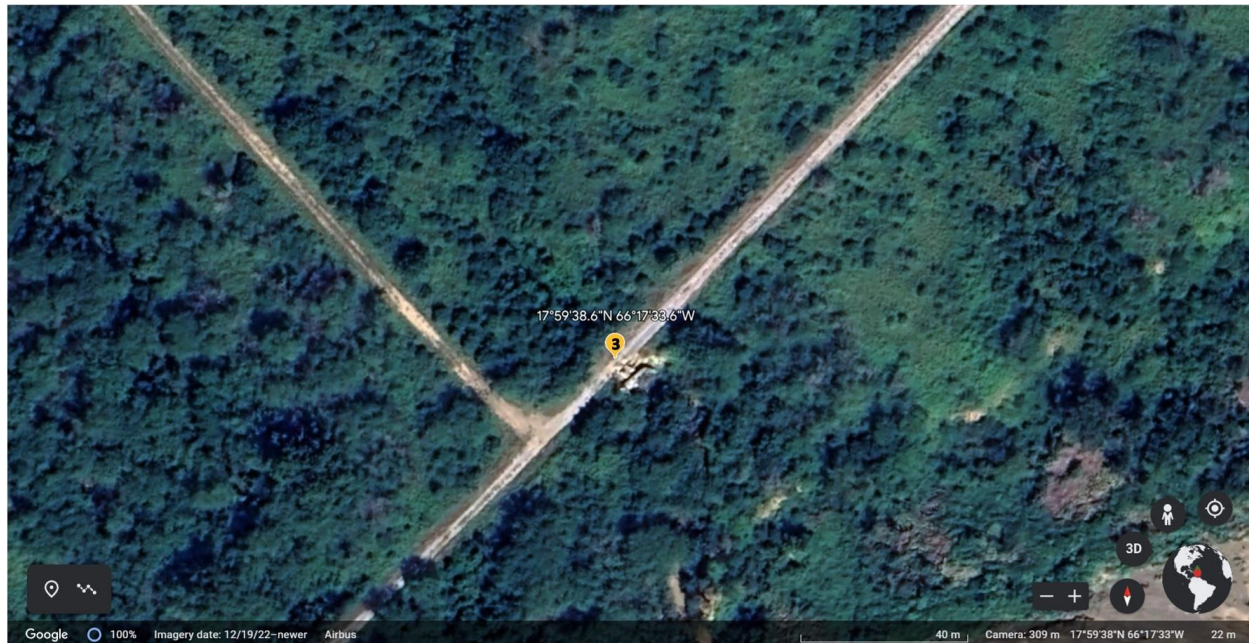
Site #2



Site #2

SITE #3

Site #3	432317	Drainage Ditch toward the Radar	1. As-Built indicating existing conditions 2. Demolition drawing for the existing bridge	1. Demolition of existing bridge 2. Construction of new bridge with the same capacity as the existing one
			3. Design new bridge with the same capacity as the existing one	3. Erosion control measures for river banks
			4. Design erosion control measures for river banks	4. Repair damage roadway (approximately 330 FT - bridge pass)
			5. Design reparations to existing roadway (approximately 330 FT)	5. River bed cleaning (25 MTS upstream and 50 MTS downstream)





Site #3



Site #3



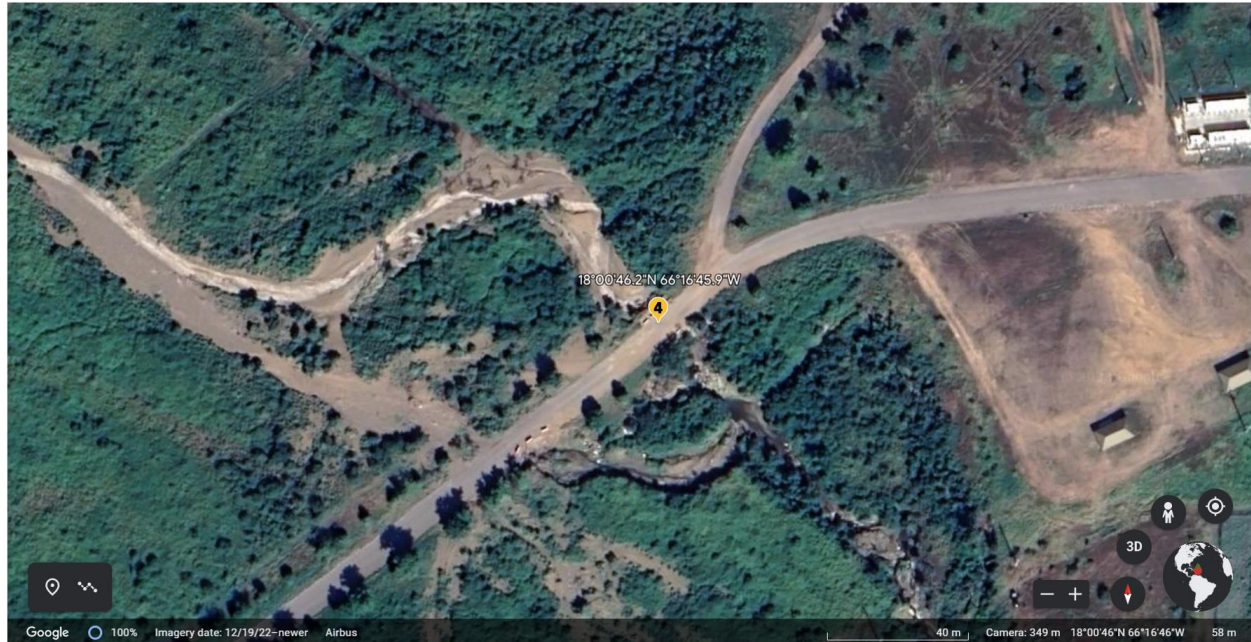
Site #3



Site #3

SITE #4

Site #4	432318	Vehicle Bridge towards Range Area	1. As-Built indicating existing conditions	1. Demolition of existing bridge
			2. Hydrologic and Hydraulic (H&H) study	2. Construction of new bridge
			3. Demolition drawing for the existing bridge	3. River bed cleaning (300 MTS upstream and 50 MTS downstream)
			4. Design new bridge	4. Repair damage roadway (approximately 300 FT - bridge pass)
			5. Design reparations to existing roadway (approximately 300 FT)	





Site #4



Site #4



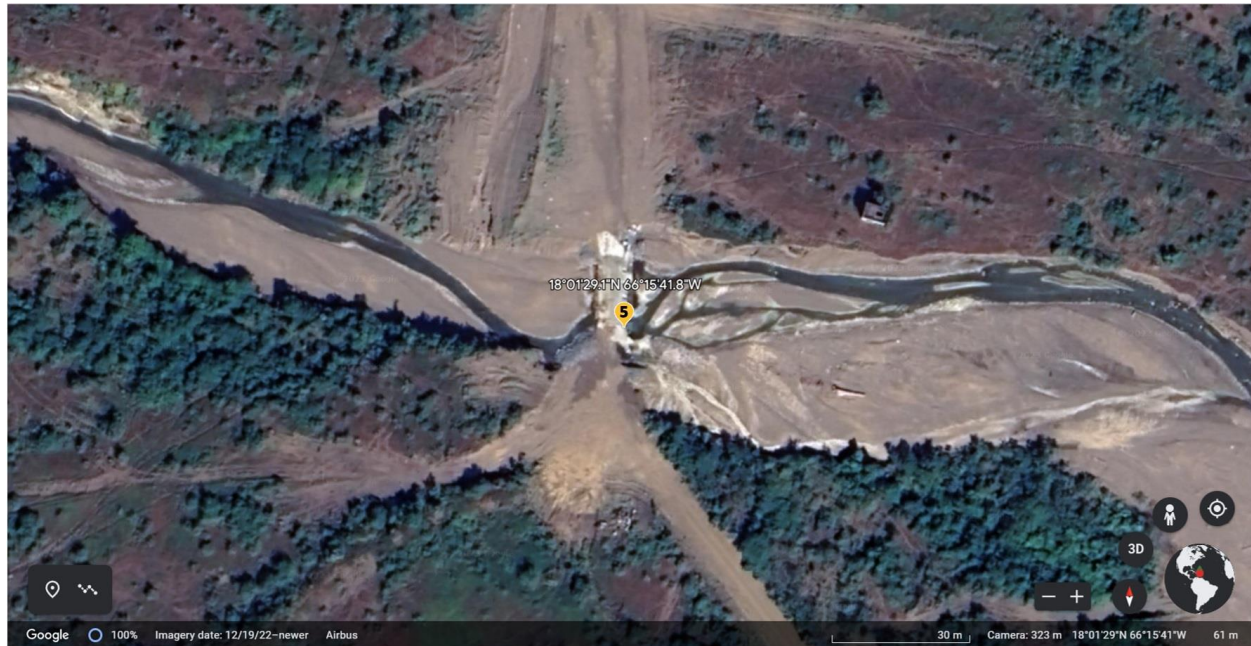
Site #4



Site #4

SITE #5

Site #5	432319	Vehicle Bridge between Range 20 and Range 27	1. As-Built indicating existing conditions	1. Demolition of existing bridge
			2. Hydrologic and Hydraulic (H&H) study	2. Construction of new bridge
			3. Demolition drawing for the existing bridge	3. River bed cleaning (150 MTS upstream and 100 MTS downstream)
			4. Design new bridge	4. Erosion control measures for river banks
			5. Design erosion control measures for river banks	





Site #5



Site #5



Site #5



Site #5

SITE #6

Site #6	432320	Vehicle Bridge Río Jueyes	1. As-Built indicating existing conditions	1. Demolition of existing bridge
			2. Hydrologic and Hydraulic (H&H) study	2. Construction of new elevated bridge
			3. Demolition drawing for the existing bridge	3. River bed cleaning (150 MTS upstream and 75 MTS downstream)
			4. Design new elevated bridge	4. Erosion control measures for river banks
			5. Design erosion control measures for river banks	





Site #6



Site #6



Site #6



Site #6

SITE #7

Site #7	432315	Vehicle Bridge towards Río Jueyes	1. As-Built indicating existing conditions	1. Demolition of existing bridge
			2. Demolition drawing for the existing bridge	2. Construction of new bridge with the same capacity as the existing one
			3. Design new bridge with the same capacity as the existing one	3. River bed cleaning (25 MTS upstream and 25 MTS downstream)
			4. Design erosion control measures for river banks	4. Erosion control measures for river banks





Site #7



Site #7






Site #7



Site #7

2.2 Assessment Report

Building Site	Salinas, Puerto Rico	Site Code	N/A	Event	Act of Nature Fiona
Building Name	Camp Santiago Joint Training Center	Inspection Date	20220922	Date of Event	20220918
Physical Address	PR-154, Salinas, 00751, Puerto Rico	Site POC	LTC Velazquez Carlo, José	Inspected by	CPT Quinones Luis/MAJ Fonseca Alejandro/Carlos Montoya/1LT Toledo
		POC phone number	787-902-2984	Comments	
Item	Component	LOCATION/GROUPING	COMPONENT DESCRIPTION	MAKE/MODEL/TYPE	QUANTITY AND EXTRA DESCRIPTIONS
1	Vehicle Bridge (In Road to ASP) (FAC# 00987)	18.00535, -66.30431	Debris obstruction removal and disposition at pipe culvert influent, debris removal and disposition approximately ten (10) meters upstream and downstream of culvert and embankment, area clean-up. Backfill and compaction of pipe culvert headwall hunching area. Reinstallation and rewiring of electrical/communication pvc conduits and infrastructure attached to the bridge siding.	Round concrete pipe culvert bridge and headwall	FAC# 00987, approximately 150 SY
					
2	Drainage Ditch (Road TO Cerro Modesto)(FAC# DD021)	17.996081, -66.289733	Repair of pipe culvert and headwall. Clean-up of debris required approximately 25 mtrs downstream from culvert structure. Repair of concrete headwall. Repair of asphalt pavement, repair or replacement of beam crash barrier, approximately 10 mtrs.	Round concrete pipe culvert bridge and headwall	FAC# DD021, approximately 180 SY
					
3	Drainage Ditch (Duplicate valid asset DD002) (FAC# DD020)	17.994047, -66.292675	Remove and dispose collapsed pipe culvert and headwall components downstream, repair collapsed pipe culvert and headwall bedding and haunching material. Remove and replace collapsed asphalt pavement, clean up of debris at pipe culvert influent. Replace concrete pipe culvert structure and headwall, redesign recommended.	Round concrete pipe culvert bridge and headwall	FAC# DD020, approximately 50 SY
					

Building Site	Salinas, Puerto Rico	Site Code	N/A	Event	Act of Nature Fiona
Building Name	Camp Santiago Joint Training Center	Inspection Date	20220922	Date of Event	20220918
Physical Address	PR-154, Salinas, 00751, Puerto Rico	Site POC	LTC Velazquez Carlo, José	Inspected by	CPT Quinones Luis/MAJ Fonseca Alejandro/Carlos Montoya/1LT Toledo
		POC phone number	787-902-2984	Comments	
Item	Component	LOCATION/GROUPING	COMPONENT DESCRIPTION	MAKE/MODEL/TYPE	QUANTITY AND EXTRA DESCRIPTIONS
4	VEHICLE BRIDGE (Towards Range Area) (FAC# 85120)	18.012841, -66.279425	Repair of collapsed asphalt pavement due to runoff overflow, repair concrete pipe culvert structure, bedding and haunching material, re-design of culvert recommended. Clean-up of debris, backfill of embankment.	Round concrete pipe culvert bridge and headwall	FAC# 85120, approximately 178 SY
					
5	Vehicle Bridge (Between RG208-RG027)(FAC# 02021)	18.0247422, -66.2616033	Remove/demolition of collapsed concrete pipe culvert structure. Backfill embankment material. Removal and disposition of debris obstruction at inlet and outlet of culvert. Replacement of access ramp to culvert bridge. Re-design of culvert recommended.	Round concrete pipe culvert bridge and headwall	FAC# 02021, approximately 356 SY
					
6	Vehicle Bridge (Rio Jueyes) (FAC# 00070)	PR-154, 18.019159, -66.330724	Demolition and disposition of collapsed concrete pipe culvert, headwall and asphalt pavement. Backfill of collapsed embankment, culvert bedding and haunching material, and bedding material of access ramp to bridge. Removal and disposition of debris obstruction at inlet and outlet, clean-up of upstream debris. Re-design of bridge culvert recommended.	Round concrete pipe culvert bridge and headwall	FAC# 00070, approximately 608 SY
					

Building Site	Salinas, Puerto Rico	Site Code	N/A	Event	Act of Nature Fiona
Building Name	Camp Santiago Joint Training Center	Inspection Date	20220922	Date of Event	20220818
Physical Address	PR-154, Salinas, 00751, Puerto Rico	Site POC	LTC Velazquez Carlo, José	Inspected by	CPT Quinones Luis/MAJ Fonseca Alejandro/Carlos Montoya/1LT Toledo
		POC phone number	787-902-2984	Comments	
Item	Component	LOCATION/GROUPING	COMPONENT DESCRIPTION	MAKE/MODEL/TYPE	QUANTITY AND EXTRA DESCRIPTIONS
7	TOWARDS RIO JUEYES LEFT SIDE INNER ROAD(FAC# D011)	18.005553, -66.300824	Collapse of culvert piping and headwall, bedding and haunching material, debris obstruction upstream and downstream. Collapse of asphalt pavement and crash beam barrier. Remove and dispose collapsed pipe culvert and headwall components downstream, repair collapsed pipe culvert and headwall bedding and haunching material. Remove and replace collapsed asphalt pavement, clean up of debris at pipe culvert influent. Replace corrugated pipe culvert, concrete structure and headwall, redesign recommended.	Round pipe culvert structure	605Y



Part 3 Attachments

3.1 DG 415-5 General Facilities Design Guide

3.2 UFC 1-300-07-A

3.3 Military Vehicle data

**ARMY NATIONAL GUARD
DG 415-5
GENERAL FACILITIES INFORMATION
DESIGN GUIDE**



**NATIONAL GUARD BUREAU
INSTALLATIONS DIVISION
111 SOUTH GEORGE MASON DRIVE
ARLINGTON, VA 22204-1382**

FOREWORD

This General Facilities Information Design Guide (DG 415-5) was published by the National Guard Bureau, Army Installations Division (ARNG-ILI). DG 415-5 applies to all projects for new construction (including additions) as well as alterations to and rehabilitation and conversion of existing facilities. It is intended to assist the States, Possessions, design agencies, and design architect-engineer in gaining an understanding of the general functions and environmental considerations to address in the design and construction documents for the Army National Guard (ARNG) facilities that qualify for support from Federal funds. This design guide does not contain criteria but refers readers to sources of criteria in other publications that relate directly to the specific technical design requirements.

DG 415-5 contains functional and technical information common to all ARNG facilities. It should be used in conjunction with the design guide developed for the specific facility type to assist in the design process.

Distribution is limited. However, authorized users of the NGB Guard Knowledge Online (GKO), can obtain an electronic copy at (gkoportal.ngb.army.mil/sites/ARI_HQ/default.aspx), Design, Guide Library site. All users are encouraged to submit comments and suggestions to improve this document by completing a DA Form 2028, "Recommended Changes to Publications and Blank Forms," and sending it directly to:

National Guard Bureau
Installations Division
ARNG Readiness Center
111 South George Mason Drive
Arlington, VA 22204-1382

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CHAPTER 1

GENERAL INFORMATION

1-1 **PURPOSE: PERFORMANCE DESIGN GUIDELINES**

This General Facilities Information Design Guide (DG 415-5), along with the facility-type design guides (DGs 415-1 Readiness Centers, 415-2 Logistics Facilities, 415-3 Aviation Facilities and 415-4 Training Site Facilities), sets forth functional and technical design and planning guidance to use in the development of military construction (MILCON) projects.

1-1.1 **Audience**

These design guides are written for the design architect-engineer (A-E) who will be preparing design and construction documents as well as for construction and facilities management officers (CFMOs) and other Army National Guard (ARNG) personnel who will be planning, reviewing, and approving the facility design. It is the intent of the National Guard Bureau, Army Installations Division (ARNG-ILI) to encourage the design A-E to design high-quality, user-friendly, functional, energy-efficient, and sustainable facilities using the latest engineering and construction industry standards.

To aid the reader, DG 415-5 includes the following:

- Appendix A, References, contains a detailed list of reference documents.
- Appendix B, Glossary, defines all abbreviations and acronyms used in this design guide as well as specialized terms that are used in this design guide.

1-1.2 **Master Plan Compliance**

Before project initiation, the CFMO should provide the design A-E with an approved working or preliminary master plan for the proposed facility site. The State Military Department should provide special instructions for any deviations from the master plan. The design A-E should consider sustainable material types and construction industry standards indicated in these design guidelines to establish the minimum project quality.

1-2 **ROLE OF THE FEDERAL GOVERNMENT**

Title 10 of the United States Code (U.S.C.) authorizes contributions of Federal funds to the States and possessions to provide facilities for the training and administration of Reserve components of the Armed Forces. NG PAM 415-12 establishes facilities allowances, and these design guides provide the design and construction performance recommendations governing such contributions from Federal funds that the NGB Chief administers. Each such contribution is subject to the terms of a Military Construction

Cooperative Agreement executed specifically for providing designated facilities. These agreements are executed under authority granted in Title 10, United States Code, Chapter 1803, which states that all work “shall be done according to the laws of that jurisdiction and under the supervision of its officials, subject to inspection and approval of the Secretary of Defense.” The United States Property and Fiscal Officers (USPFO) are responsible for disbursement of Federal funds contributed toward the construction of State ARNG facilities projects.

1-3 NATIONAL GUARD BUREAU POLICY

ARNG-ILI has specific policy regarding the types of buildings and installed equipment eligible for Federal support in ARNG facilities, as outlined in the following paragraphs.

1-3.1 Technical Instructions Criteria

Where specified guidelines are not set forth herein or in the program documents, design criteria in NGR 415-10, NG PAM 415-12, Unified Facilities Guide Specifications and MIL-STD 3007F apply for all MILCON projects.

1-3.2 Construction and Equipment Materials Criteria

The materials and equipment allowances are to be considered the maximum allowable using Federal contributions toward construction costs. Use of the full maximum allowances is permissible rather than mandatory because local conditions may justify the actual facility constructed.

A project's DD Form 1390/91 documents the approved scope and Federal share for each component of the project, and the CFMO may not design or construct beyond this level without receiving ARNG-ILI approval or an amended funding document.

1-3.3 Federal Support

In order for an ARNG facilities project to qualify for Federal support, the materials and equipment incorporated, built-in, or installed shall be submitted and approved by ARNG-ILI at or prior to Final Design (95%).

1-3.4 Non-Federal Funds

These design guides do not preclude the use of non-Federal funds to provide materials, equipment, or features of higher quality than suggested, provided that the Federal share of the operating and maintenance cost does not increase. The cost of such improvements, however, must be clearly determinable as separate bid items or specified as a contractor's option. If the amount of higher-quality features, equipment, materials, and space not Federally supportable is unusually large and makes separate bidding impractical, the State and the Federal Government must negotiate an agreement to establish the limitations of the Federal share of the overall project construction costs. This is usually expressed as a percentage of the total construction cost.

1-3.5 Equipment Not in Contract

Portable furniture and equipment may not be supported by Federal construction funds. Examples are desks, chairs, tables, stools, map cases, unattached shelving, fire extinguishers, coats of arms, State seals, memorial plaques, entrance door mats, and waste receptacles.

1-3.6 Performance Focus

ARNG-ILI encourages the use of contractor's options and performance-type specifications as a means of ensuring procurement of the most economical system or component. The materials and methods of construction proposed for use on a given facility must have been used on a sufficient number of State facilities to establish a documented record of performance.

For functional area flexibility, the design A-E may increase or decrease individual functional areas by exchanging a percentage of the area between functions as per NG PAM 415-12, Chapter 1-7. However the total net functional area may not exceed that authorized for the facility unless it is funded with other than Federal funds.

1-3.7 Accessibility

All ARNG facilities shall be designed and constructed in accordance with Public Law 90-480, the Architectural Barriers Act (ABA) of 1968, as amended. The document that sets standards as a result of this law is the Uniform Federal Accessibility Standards (UFAS). These standards primarily address projects in the Federal sector or projects built and leased with Federal funds. Currently, UFAS applies to all ARNG projects.

After the Americans with Disabilities Act (ADA) of 1990 were enacted, the U.S. Access Board under the Department of Justice has regularly updated the ADA Accessibility Guidelines (ADAAG). These guidelines address projects in the private sector (places of commercial accommodation and commercial facilities) and the public sector (State and local government facilities). Currently, ADAAG applies to all ARNG projects.

New guidelines, which combine UFAS and ADAAG into one unified standard, were published in the *Federal Register* in July 2004 and became effective on September 21, 2004. This unified standard, the Americans with Disabilities Act and Architectural Barriers Act Accessibility Guidelines, was created under 36 CFR, Parts 1190 and 1191. This rule contains a separate scoping document for ADA facilities, a scoping document for ABA facilities, and a joint technical section referenced by each scoping section. Refer to the summary of the new guidelines in the July 23, 2004, *Federal Register*, which contains a detailed description and background information. The latest version of this standard is 2010 ADA Standard for Accessible Design (by the Department of Justice). ARNG intends to apply this standard in lieu of the separate ADAAG and UFAS.

As noted in the preamble to the UFAS, the basis for the first accessibility standards adopted by the Federal government and most State governments was ANSI 117.1, Accessible and Usable Buildings and Facilities. This code has been recognized by the

private sector and the Council of American Building Officials, and is the accessibility code referenced in the International Building Code (IBC). Because ARNG projects follow a statewide building code in many instances, this code may apply when referenced by the adopted model statewide building code. The design A-E is directed to compare the accessibility codes and use the more stringent one. The new, unified Americans with Disabilities Act and Architectural Barriers Act Accessibility Guidelines may reduce the potential for conflicts with other regulations developed by State agencies.

1-3.8 Hazardous Materials Abatement

The design A-E will need to comply with all U.S. Environmental Protection Agency (EPA) reference documents. The design A-E shall also consult with the CFMO to determine any special State and local requirements.

1-3.8.1 Asbestos Removal

Before facility buildings are programmed or planned for alteration, rehabilitation, and addition, a survey should be undertaken to establish the amount, location, and estimated cost of asbestos removal. A letter should be sent from the CFMO to ARNG-ILI to indicate that there is an asbestos problem and that authorization to do an asbestos survey and design for removal is urgently needed because asbestos has to be removed prior to any construction.

The cost of asbestos removal should be included as an item in the program and funding documents. The cost of the survey and asbestos removal is 100 percent supportable by Federal funds for all functional areas authorized in the Federal project requirements.

If only a portion of an existing building requires alteration or rehabilitation, all the asbestos in the building must be removed before beginning the alteration or rehabilitation phase of the project. If emergency repairs (such as re-insulating a boiler) are needed after asbestos removal, the asbestos removal portion of the project should include the repair cost.

1-3.9 Value Engineering Studies and Life Cycle Cost Analysis

The State is encouraged to acquire the services of a Certified Value Specialist (CVS) to lead the value engineering study (VES) to ensure that design solutions are cost effective. The VES also serves as a means of identifying opportunities for substitutions during the design process, should the project exceed budget requirements, while still maintaining the level of quality performance expected.

The VES should be accomplished early in project development once the design concept and the building systems have been initially defined. Each item in the VES should be clearly defined by narrative and drawing, and the cost savings should be shown with related calculations. The specific, formally documented VES recommendations should be incorporated in the Preliminary (35-50%) Design milestone design review submission to NGB-ARI. Before proceeding with project development beyond the Preliminary milestone, all VES decisions should be made regarding which recommendations to implement immediately and which to consider contingent items to

incorporate if costs continue to exceed budget. The VES should be a 3-day limited workshop since the site has been selected by the State prior to the design phase. The VES Workshop should adhere to the 5-step methodology and approach prescribed by the Society of American Value Engineers (SAVE) International.

An integral part of the VES process is life cycle cost analysis (LCCA), which is a systematic means of evaluating the entire building initial, energy, operation and maintenance cost over an extended period of time. A formal LCCA should be used to compare system alternatives. This process requires caution because the recommended system may increase the facility initial cost above the approved programmed funding amount.

1-3.10 Signage and Graphic Standards

All signage and graphics at a facility should comply with requirements of the State Military Department; General Services design standards or industry standards. If the proposed facility is located on a U. S. Armed Forces military installation, local signage standards should be followed.

1-3.11 Project Scheduling Requirements

(ARNG ILI will provide form)

1-3.12 Warranty Requirements

ARNG-ILI requires that products and systems have warranty provisions according to industry standards. The following list identifies the majority of these elements under the Unified Facilities Guide Specification (UFGS)/CSI 2004 MasterFormat that may occur in ARNG facilities.

DIVISION 02 – EXTERIOR IMPROVEMENT

- Water Distribution System
- Packaged Sewage Pumping Station
- Irrigation Systems
- Seeding, Sodding, Plants, and Planting

DIVISION 03 – CONCRETE

- Concrete Surface Sealer
- Glass Fiber-Reinforced Concrete

DIVISION 04 – MASONRY

- Brick Masonry

DIVISION 05 – METALS

- Shop Applied Metal Finishes

DIVISION 06 – WOOD, PLASTICS AND COMPOSITES

- Laminated Wood Construction
- Polymer Surfacing Materials

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

- Waterproofing
- Water Repellent Coatings
- Cementitious Damp proofing
- Exterior Insulation Finish System
- Fireproofing
- Roofing
- Metal Siding and Wall Panels
- Fluid Applied Deck Coatings
- Flashing and Sheet Metal
- Roof Hatches
- Joint Sealants

DIVISION 08 – OPENINGS

- Steel Doors and Frames
- Wood Doors
- Glass Door Assemblies
- Aluminum Storefront and Windows
- Wood Windows
- Skylight Systems
- Finish Door Hardware
- Glass and Glazing
- Curtain Wall Systems

DIVISION 09 – FINISHES

- Exterior Studwall System
- Ceramic and Quarry Tile
- Terrazzo
- Acoustical and Other Specialty Plaster Finishes
- Wood Flooring
- Resilient Flooring
- Carpet and Carpet Tile
- Fluid-Applied Seamless Flooring
- Wall Coverings

DIVISION 10 – SPECIALTIES

- Markerboards and Tackboards
- Toilet Partitions
- Access Flooring Systems
- Demountable Partitions
- Toilet and Bath Accessories

DIVISION 11 – EQUIPMENT

- Window Washing System Equipment

Dock Levelers and Lifts
Food Service Equipment
Detention Equipment
Shooting Range Equipment

DIVISION 12 – FURNISHINGS

Architectural Casework
Window Shades
Entrance Mats

DIVISION 13 – SPECIAL CONSTRUCTION

Prefabricated Wall and Partition Systems
Prefabricated Radio Frequency Shielding Enclosure
Pre-Engineered Buildings

DIVISION 14 – CONVEYING SYSTEMS

Elevators

DIVISION 21 – FIRE SUPPRESSION SYSTEMS

DIVISION 22 – PLUMBING

Plumbing Fixtures and Pumps
Gas and Vacuum Systems
Fuel Oil Systems

DIVISION 23 – HEATING, VENTILATING & AIR CONDITIONING

Chillers
Cooling Towers
Steam Generators
Unit Heaters
Packaged Air-Handling Units
Exhaust Fans
Fiberglass Reinforced Plastic Ductwork

DIVISION 25 – INTEGRATED AUTOMATION

Energy Management and Control System
Utility Monitoring and Control System

DIVISION 26 – ELECTRICAL

Wiring Devices
Lighting Fixtures
Uninterruptible Power Supply Systems
Standby Power Generator Systems
Battery Powered Systems

DIVISION 27 – COMMUNICATIONS

Administrative Telephone Equipment

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

Electronic Security System

Closed Circuit Television Systems

Fire Alarm and Detection System

Mass Notification System

1-3.13 Performance Specifications

The Unified Facilities Guide Specifications (UFGS) with technical notes is available to the A-E design team via the Whole Building Design Guide website at (www.wbdg.org/ccb/browse_org). However, the A-E is encouraged to suggest areas where a creative solution could be better managed through a performance-based specification for that particular element. Given the dual role of many ARNG facilities, the need for flexibility could become a driver for a creative solution using this method. Such a method could be considered in the following situations:

- Where the desired systems have not evolved to standardized configurations or solutions from manufacturer to manufacturer, or where no alternatives are similar enough that a prescriptive method could be used without inadvertently excluding all other variations of the system desired. Examples are a new integrated system for automated vehicle wash racks, a specialized type of paint removal system, or even a large-scale paint spray system or other industrial-based process.
- Where it is desirable, because of complexity or for other reasons, to delegate the responsibility for designing and integrating a particular system to an industry specialist. An example of this is crane systems.

Careful coordination is required to define the performance-based requirements, criteria, and tests for a particular attribute or system.

The design standards for finishes in ARNG facilities favor a more flexible set of recommendations and parameters for finish performance. The design A-E should continue this flexible approach in the design process, working from a palette of finishes that meet these requirements and criteria. This flexible approach may be extended to the specifications process for finishes, where the requirements and criteria can be well defined.

1-3.14 Operation and Maintenance Design Priorities

Important aspects of the design of all Army National Guard facilities are the selection of maintainable finishes and the provision of access or placement of building equipment and other fixed elements. The following are ways to address concerns in the design process:

- Select finishes based on the durability requirements related to the use of the space.
- Specify slip-resistant floor materials and finishes where water can be tracked in.
- Position heating, ventilation, and air conditioning (HVAC) and other mechanical and electrical components that are located above the ceiling and require servicing within easy reach from below to avoid the need for a service lift and major ceiling disassembly.
- Allocate adequate clearances for the servicing and replacement of large pieces of building mechanical and electrical equipment.
- Provide for ready access to wells and containment systems for inspection.
- Consider the use of a low-power traction elevator system that is competitive in cost with hydraulic units, and consider a machine room that can fit inside the hoistway.
- The designer should specify Total Building Commissioning when programmed in the DD Form 1390/91 funding document at 1% primary building cost.

1-3.15 Applicable Codes and Standards

The references list in Appendix A pertains to national standards, the International Building Code (IBC) will be considered as the minimum acceptable standard for ARNG Design Guides. The CFMO should provide in writing for the design A-E all categories of State regulations that exceed national standards.

1-3.16 Fire Protection

Fire protection guidelines follow:

- Incorporate efficient and cost-effective fire protection and detection systems in all ARNG facility designs.
- Comply with the requirements for all building space types presented in the International Building Code and National Fire Protection Association (NFPA) standards and with criteria presented in UFC 3-600-01 Fire Protection Engineering for Facilities. Also address State and local requirements that are more stringent than these sources.
- Ensure that the municipal water supply pressure and capacity or independent means (including storage tanks) comply with the water source requirements of the fire suppression systems.

- Provide adequate water source, sprinkler, emergency generator, and alarms systems capacity to accommodate limited building expansion on site.
- Include the means of egress, with all related calculations. Maintain the proper dimensions of all means of egress during detailed design.
- Identify all rated separations, and ensure that all building systems components at these separations support the rating.
- Coordinate smoke evacuation systems with the HVAC design.
- Adequately isolate and vent areas with highly combustible products, including the petroleum, oils, and lubricants (POL) storage.
- Ensure that the antiterrorism/force protection (AT/FP) standoff barrier components include access for fire-fighting apparatus.
- Telecommunication/Information Technology spaces must comply with the above codes for a primary system, a secondary Halon alternative clean agent fire extinguishing system maybe used.

1-3.17 Occupational Health and Safety

1-3.17.1 General Information

The U.S. Department of Labor, Occupational Safety & Health Administration (OSHA) Standards for General Industry in 29 CFR Part 1910 and DA PAM 40-503, Industrial Hygiene Program, requires that ARNG provide a safe and healthy workplace for its employees. All Readiness Centers with Indoor Firing Ranges, Logistics and Aviation Maintenance facilities must have an Industrial Hygiene / Chief Surgeon's Office (ARNG-CSG-P) technical review prior to construction. Personal protective equipment (PPE) and administrative procedures are only interim measures for controlling occupational hazards. The following paragraphs address other measures.

1-3.17.2 Noise and Vibration Reduction

Noise-induced hearing loss is one of the most common occupational hazards. Currently, ARNG uses PPE as the main means of preventing hearing loss; however, engineering controls would be more effective. Mechanical equipment rooms contribute most of the high noise and vibration levels in buildings. The design A-E should take great care when locating these spaces to avoid adjacencies with incompatible noise tolerances. Mechanical equipment mounted rigidly to the supporting structure produces excessive vibration levels. The design A-E shall select vibration isolation methods to eliminate these problems. For equipment applications the designer should reference ASHRAE Handbook of Fundamentals.

1-3.17.3 Indoor Air Quality

The design of the building HVAC and exhaust systems must include indoor air quality features to ensure a safe environment. The design A-E should follow American National Standards Institute/American Society of Heating, Refrigerating and Air-Conditioning Engineers (ANSI/ASHRAE) Standard 62.1-2007, which recommends the minimum outdoor air rates for buildings, and the American Conference of Governmental Industrial Hygienists (ACGIH) Industrial Ventilation Manual for recommended practices related to specific exhaust and ventilation systems design.

A combination ventilation and exhaust system needs to be designed for the specific occupancy and process within each area to meet the indoor air quality standards. The design A-E should establish temperature, humidity, and ventilation criteria for each space and should design special exhaust hoods where necessary. Although specific humidity criteria may not be published for many areas, all conditioned spaces should be designed to maintain not higher than 50 percent relative humidity (RH).

Consideration must be given to air quality in storage rooms and similar spaces. Although these areas are not normally occupied, they may require ventilation, temperature, and/or humidity control to prevent damage to stored material and provide an acceptable environment for personnel using the room.

Air-handling unit (AHU) design should minimize mold and mildew growth inside the units. AHUs should have a filter bank (pre-filters @ 30% and final filter @ 85% efficient) base on *ASHRAE Standard 52.1-1992 Atmospheric Dust-Spot Efficiency* rating to prevent dust collection on coils, and drain pans should be properly sloped and provided with condensate traps to eliminate standing water in the units. AHUs should not be operated during construction without proper filters in place, and all filters should be replaced at turnover to the ARNG.

1-3.17.4 Location of Air Exhaust and Intake

Exhaust air discharges and vents must be located at a proper distance from intakes to prevent cross-contamination and must be in a location which does not expose people or other buildings to hazardous discharge. Outside air intakes must also be located to minimize induction of vehicle exhaust and other site contaminants; in addition, they must be located and protected as prescribed by antiterrorism requirements. The design A-E should follow the recommended guidelines of ACGIH and local building codes.

1-3.18 Energy Efficiency

It is important to emphasize building envelope, mechanical and electrical systems efficiency as referenced in *UFC 3-400-01, Design: Energy Conservation*. An LCCA is to be performed to evaluate at least two proposed mechanical systems. The Energy Policy Act of 2005 (EPA-05) amended in 2007 published guidelines to design/construct buildings 30% more efficient than ANSI/ASHRAE/IESNA Standard 90.1-2007, if life cycle cost effective. The building envelope, mechanical and electrical systems must be designed in accordance with ANSI/ASHRAE/IESNA 90.1-2007 or the State energy

codes. The use of air-side or water-side heat recovery systems should be considered where they can be applied effectively.

ARNG buildings are frequently occupied on irregular schedules, with many areas used only on weekends and/or at night. Therefore, the mechanical systems should be zoned so that heating, cooling, and ventilation can be reduced in portions of the building when they are unoccupied.

1-3.19 HVAC System Quality

When selecting mechanical equipment and designing systems, the A-E should strive for a system that will provide low maintenance and long life while providing a quality indoor environment. The use of rooftop packaged AHUs should be minimized because of their relatively short life and the inconvenience of servicing them. Double-wall AHUs are generally more robust and more easily maintained. Stainless steel condensate drip pans and cooling coil casings extend the life of an AHU and provide a cleaner surface, which reduces growth of mold and mildew. The designer should use ASHRAE Handbooks of Fundamentals, HVAC Applications and HVAC Systems and Equipment as guidance.

On larger installations, hydronic cooling utilizing a central chiller plant should be investigated in lieu of packaged direct expansion (DX) cooling, which typically is more maintenance intensive. The design A-E should avoid using steam for heat distribution as the boiler and piping system are more difficult to maintain than hot water. Direct-fired warm air furnaces and unit heaters typically require more maintenance and have a shorter life than hydronic systems; they should be used only in small installations where a central system is not practical.

1-3.20 Geotechnical Investigation

Site selection and Federal support shall conform to NGR 415-5, Chapter 4. Based on a visual observation of the site and knowledge of the local area, an appropriate number of soil borings should be made to determine the nature and consistency of subsurface soil conditions. Additional borings are warranted if the results are inconclusive or insufficient for the foundation and pavement design. The Site Survey Report, to be prepared in accordance with NGR 415-5, must include the results of the investigation of the selected site. The CFMO and NGB-ARI use the completed Soil Bearing Capacity Declaration (NG PAM 415-5, Appendix G) to gauge the adequacy of the site and thus determine whether to grant Federal funds for construction of the facility at that particular location. This declaration should include the actual allowable design soil bearing capacity.

1-3.21 Bid Format Information

Two types of formats may be used for bidding:

- All Bid Formats are located in NG PAM 415-5, Appendix L.

Separate bids must also be obtained for the Intrusion Detection Systems and Interior Intrusion Detection System equipment-in-place, maintenance repair, and other support items to identify the funding support when provided from different accounts or to identify varying proportions of Federal/State cost sharing. Although the bids may be lump sum for each item, the quantity and unit of measure for each should be included, where practical, showing the magnitude of work required.

The bids of all authorized items (including site preparation and the IDS) are to be totaled before listing additive and/or alternative items that are to be supported with other than Federal funds. A written description of each bid is also to be provided to define the scope of work associated with the bid amount.

In addition, unit price bids should be obtained for the various types of work that may have to be increased or decreased during the period of construction, or when the unit cost of work must be utilized to determine the cost of work in excess of authorized amounts (such as excess foundation walls, exterior walls, and interior partitions).

1-3.22 Commissioning Buildings and Systems

Total building (enhanced) commissioning is recommended for all ARNG MILCON projects for new construction and major renovation. Fundamental Commissioning of Building Energy Systems is a prerequisite for LEED-NC and Enhanced Commissioning is a one (1) point credit.

The total cost allowed for this activity will be 1% of the Primary Facility Cost. A line item cost of 0.6% for the construction phase will be indicated on the DD Form 1390/91 Funding Document. The design phase allowance of 0.4% will be funded with P&D funds. This cost allowance includes the services of an Independent Commissioning Agent. The CFMO should provide the design Architect-Engineer and the Commissioning Agent a copy of the ARNG COMMISSIONING RFP/SOW prior to design startup.

Commissioning Defined:

- The National Conference on Building Commissioning has established an official definition of Total Building Commissioning as “The systematic process of assuring by verification and documentation, from the design phase to a minimum of one after construction, that all facility systems perform interactively in accordance with the design documentation and intent and in accordance with the owner’s operational needs, including preparation of operation personnel”.

Commissioning with respect to the U. S. Green Building Council Leadership in Energy and Environmental Design for New Construction and Major Renovations (LEED-NC), Energy & Atmosphere;

- EA Prerequisite 1: Fundamental Commissioning of the Building Energy Systems are required for all ARNG MILCON projects. The intent is to verify that

the building's energy related systems (Mechanical/HVAC/Electrical) are installed, calibrated and perform according to the owner's project requirements, basis of design and construction documents.

- EA Credit 3: Enhanced Commissioning, this commissioning process begins early during the design process and execute additional activities after systems performance verification is completed.

CHAPTER 2

ANTITERRORISM/FORCE PROTECTION

2-1 GENERAL INFORMATION

Any building or portions of buildings routinely occupied by 11 or more DoD personnel with a population density greater than one person per 430 ft² requires the minimum antiterrorism/force protection measures. Compliance with the U.S. Department of Defense (DoD) Minimum Antiterrorist Standards for Buildings (UFC 4-010-01) is not an option. However, the individual State's AT/FP officer's recommendations to the adjutant general determine the level of protection required (the degree to which assets are protected against injury or damage from an attack) at the specific site.

These standards may be supplemented where specific terrorist threats are identified, where more stringent local standards apply, or where local commanders dictate additional measures. The individual State Antiterrorism/Force Protection Officer recommendations to the Adjutant General assist in determining the level of protection required (the degree to which assets are protected against injury or damage from an attack) at the specific site. At a minimum, the level of protection identified in UFC 4-010-01 for Inhabited Buildings, Primary Gathering Facilities, Billeting, and High Occupancy Family Housing will be incorporated into the design.

During the design process, the design A-E shall conduct all protection analysis as described in DA PAM 190-51, DOD Security Engineering Publications UFC 4-020-01FA, UFC 4-020-02FA, UF 4-020-03FA and UF 4-020-04FA. For some protective strategies, the design process may include identification of multiple scenarios or alternatives for achieving the required level of protection. All alternatives should undergo a suitability analysis, which takes into account factors that may limit the feasibility of the concepts. Potential future expansion of the new facilities should be considered in the analysis. Factors limiting effective AT/FP strategies may consist of physical, resource, and political constraints such as land area restrictions.

2-2 DESIGN PHILOSOPHY

The security engineering requirements identified in UFC 4-010-01 Minimum Antiterrorism Standards for Buildings, UFC 4-010-02 Minimum Standoff Distances for Buildings (FOUO), and UFC 4-023-03 Progressive Collapse provide the framework for incorporating major design strategies (Civil, Structural, Architectural, Mechanical, and Electrical) that are the most effective and economical in protecting DoD personnel from terrorist attacks.

Baseline Threat: The location, size, and nature of terrorist threats are unpredictable. The standards identified in UFC 4-010-01 are based on a specific range of assumed threats that provide a reasonable baseline for the design of all inhabited DoD buildings. Designing to resist baseline threats will provide general protection today and will establish a foundation upon which to build additional measures where justified by higher threats or where the threat environment increases in the future. While those baseline threats are less than some of the terrorist attacks that have been directed against U.S. personnel in the past, they represent more severe threats than a significant majority of historical attacks. It would be cost prohibitive to provide protection against the worst-case scenario in every building. The terrorist threats addressed in the UFC 4-010-01 standards are further assumed to be directed against DoD personnel. Threats to other assets and critical infrastructure are beyond the scope of the DoD required Minimum Antiterrorism Standards, but they are addressed in UFC 4-020-01

Level of Protection: The standards in UFC 4-010-01 afford a Low level of protection for billeting, high occupancy family housing, and primary gathering buildings and a Very Low level of protection for other inhabited buildings. Greater protection is provided for primary gathering buildings, billeting, and high occupancy family housing because of the higher concentration of personnel and the more attractive nature of the target.

2-2.1 Standoff Zone: The primary design strategy is to keep aggressors as far away from inhabited DoD buildings as possible. The easiest and least costly opportunity for achieving the appropriate levels of protection against terrorist threats is to incorporate sufficient standoff distance into project designs. While sufficient real estate is not always available to provide the standoff distances required for conventional construction, maximizing the available standoff distance always results in the most cost-effective solution. Maximizing standoff distance also ensures that there is opportunity in the future to upgrade buildings to meet increased threats or to accommodate higher levels of protection.

2-2.2 Building Structural Design. Provisions relating to preventing building collapse and building component failure are essential to effectively protecting building occupants. Those provisions apply regardless of standoff distance or the ability of a building to resist blast effects. Designing those provisions into buildings during new construction or retrofitting during major renovations, repairs, restorations, or modifications of existing buildings is the most cost effective time to do that. In addition, structural systems that provide greater continuity and redundancy among structural components will help limit collapse in the event of severe structural damage from unpredictable terrorist acts.

2-2.3 Hazardous Flying Debris. In past explosive events where there was no building collapse, a high number of injuries resulted from flying glass fragments and debris from walls, ceilings, and fixtures (non-structural features). Flying debris can be minimized through building design and avoidance of certain building materials and construction techniques. The glass used in most windows breaks at very low blast pressures,

resulting in hazardous, dagger-like shards. Minimizing those hazards through reduction in window numbers and sizes and through enhanced window construction has a major effect on limiting mass casualties. Window and door designs must treat glazing, frames, connections, and the structural components to which they are attached as an integrated system. Hazardous fragments may also include secondary debris such as those from barriers and site furnishings.

2-2.4 Building Layout. Effective design of building layout and orientation can significantly reduce opportunities for terrorists to target building occupants or injure large numbers of people..

2-2.5 Airborne Contamination. Effective design of heating, ventilation, and air conditioning (HVAC) systems can significantly reduce the potential for chemical, biological, and radiological agents being distributed throughout buildings.

2-2.6 Mass Notification. Providing a timely means to notify building occupants of threats and what should be done in response to those threats reduces the risk of mass casualties. Refer to UFC 4-021-01 Mass Notification Systems.

2-2.7 Future Upgrades. Many of the provisions of these standards facilitate opportunities to upgrade building protective measures in the future if the threat environment changes.

2-3 DESIGN ELEMENTS

2-3.1 Standoff Distances. The primary impact on project scope for sitework will be the establishment and maintenance of standoff distance. That standoff will have to be provided to any location that is accessible to vehicles. For the stationary vehicle bomb tactic those locations may be limited to those that have legitimate vehicle access such as parking areas and roadways. The key to understanding the planning implications of the standoff distance is in knowing the type of vehicle and the explosive weight associated with the threat and determining where access of those vehicles will be controlled. The approach, therefore, is to establish a standoff distance based on the largest applicable explosive weight based on the applicable threat severity level and require access procedures for entry past that perimeter to be applied to all vehicles at that standoff distance.

The conventional construction standoff distances identified in UFC 4-010-01 Tables B-1 and D-1 were developed by the U.S. Army Corps of Engineers to provide survivable structures for a wide range of conventionally constructed buildings and expeditionary/temporary structures. These buildings range from tents and wood framed buildings to reinforced concrete buildings. The pressures resulting from explosive blasts can be very high, but they decrease rapidly with distance. That suggests that where land is available the least expensive way to provide protection against explosives is to maximize the standoff distance. The general design strategy, therefore, is to provide as

much standoff distance between protected facilities and potential locations for vehicles, such as parking areas, roadways, and other locations that could be accessible by vehicles.

2-3.2 Facility Arrangement

When possible, facilities that are functionally compatible and have similar threat levels should be clustered. This reduces the required perimeter area to be protected, limits access points to serve multiple facilities, and promotes compact security areas. However, the practical benefits of clustering facilities must be balanced against the survivability benefits of resource dispersal in the event of an attack. The arrangement of buildings into complexes that have strongly delineated boundaries and are oriented to enhance the surveillance opportunities creates a “defensible space” that can be protected more efficiently than scattered buildings.

2-3.3 Vehicular Access and Circulation

Limiting the opportunities for aggressors to get close to buildings with vehicles is the first line of defense. Ways to achieve the minimum standoff distance from vehicle circulation or parking include creating a buffer zone using design features such as landscape elements and bollards. However, the design must address site access and circulation for fire department apparatus and other emergency vehicles. The site circulation should be designed to prevent high-speed approaches by vehicles. The vehicle entrances should be offset from the major areas of high-risk concentration, and higher-risk resources should be in a location that is remote from primary roads.

2-3.4 Site Perimeter Vehicle Inspection

At facilities requiring vehicle inspection or controlled access, the design considerations are as follows:

- Provide space for inspection and waiting in line at the site access point, with adequate protection from inclement weather.
- Incorporate design features that are appropriate with regard to the threat assessment (see paragraph 4-1.2) and prevent vehicles from breaching the perimeter before being inspected.
- Whenever possible, accommodate commercial, service, and delivery vehicles by providing a separate, designated entry that preferably is distant from higher-risk resources.

Locate driveup or drop-off areas away from large glazed areas of the building to minimize the effects of an explosive blast

2-3.5 Site Lighting

Effective, uniform site lighting levels should be provided at a minimum of 0.50 foot-candle (FC) across the site and supplemented with additional focused lighting at vehicle and pedestrian entrances. Site lighting should be evaluated and designed in accordance with IES-NA. The lighting design should be coordinated with the closed-circuit television (CCTV) system, motion detection (NGB-ARI Delite System) and other means of surveillance to optimize their effectiveness.

2-3.6 Site Signage

Confusion over site circulation, parking, and entrance locations can weaken site security. Therefore, signs should be provided to properly orient all who are coming to the site. Signage should include on-site directional information, parking, and cautionary signs for visitors, employees, service vehicles, and pedestrians.

2-3.7 Landscaping

Landscaping design can enhance or be a detriment to the security design. Such elements as earth berms and trees can provide barriers, but all landscape features should be carefully designed to coordinate with site surveillance when the plants are fully grown. Landscape plantings can be used to conceal above-ground utility systems, but utilities should be installed underground when possible.

2-3.8 Architectural and Engineering Building Systems Design

The specific requirements for AT/FP are described in detail in UFC 4-010-01 and UFC 4-023-03, Design of Buildings to Resist Progressive Collapse.

CHAPTER 3

SUSTAINABLE DESIGN AND DEVELOPMENT

3-1 GENERAL INFORMATION

Sustainable Design and Development (SD&D) includes the design, construction, and operation of buildings to reduce negative impacts on the environment, improve the health and comfort of the building occupants, and reduce operating costs while improving building performance. SD&D requires a multi-disciplinary approach that incorporates a wide range of strategies and objectives set in *Executive Order, (EO) 13423, Strengthening Federal Environmental, Energy and Transportation Management* into the design and construction process. The Energy Independence and Security Act of 2007 (EISA 2007) increased federal energy reduction goals. The *National Guard Bureau Army Installations Division sustainable design and development goal for all MILCON projects is a U. S. Green Building Council Leadership in Energy and Environmental Design-New Construction & Major Renovations Version 3 (LEED-NC™ v3) Silver Certification. All MILCON project must be registered with the Green Building Certification Institute (GBCI) @ www.gbci.org.*

3-2 GREEN BUILDING RATING SYSTEM

The design Architect-Engineer must use the Green Building Rating System LEED-NC™ 3, developed by the U.S. Green Building Council (USGBC). The LEED-NC™ version 3 rating system is based on compliance with a series of prerequisites and credits to obtain a score within categories of recognition. Five principal categories of sustainable design, which also support other Federal goals in energy and environmental initiatives, have been identified using LEED-NC as a central organizing system:

- Sustainable site design
- Protection and conservation of water
- Design for energy efficiency and consideration of alternative sources of energy
- Optimization of the environmental life cycle of materials
- Enhancement of indoor environmental quality

The following outlines the major objectives and sample strategies for each of these sustainable design categories:

3-2.1 Sustainable Sites

Objectives:

- Promote natural areas.
- Minimize impacts on the site and surroundings.

Sample Strategies:

- Encourage alternative means of transportation.
- Protect from wind and water erosion.
- Use highly reflective paving and roofing materials.
- Use a vegetative roof surface for stormwater management.
- Restore damaged habitat.
- Brownfield Redevelopment (Urban) to conserve greenfields.
- Manage Stormwater with Low Impact Development per EISA Section 438.
- Consult EPA technical guidance for implementing EISA Section 438, EPA 841-B-09-001 @ www.epa.gov.

3-2.2 Water Efficiency

Objectives:

- Reduce the municipal water supply and treatment burden.
- Allow water to return to the water table.

Sample Strategies:

- Landscape with native plants.
- Use water-efficient, low-flow fixtures.
- Design for rainwater catchment systems.
- Use gray water systems for landscape irrigation.
- Use biological wastewater treatment systems.

- Explore the applications of Waterfree Urinals

3-2.3 Energy Efficiency

Objectives:

- Optimize energy efficiency per ASHRAE Standard 189.1-2009, Design of High-Performance Green Buildings.
- Total Building Commissioning and Enhanced Building Energy Systems.
- Encourage renewable and alternative energy sources.
- Support international ozone protection protocols.

Sample Strategies:

- Orient the building appropriately.
- Use a highly reflective Energy Star roof.
- Explore Green/Vegetated roof systems
- Specify highly efficient HVAC equipment without the use of chloro-fluorocarbons (CFC) or hydro-chloro-fluorocarbons (HCFC) chemicals.
- Provide occupant controls for all spaces.
- Use photovoltaics and renewable energy sources.

3-2.4 Material Selection

Objectives:

- Use materials with minimum environmental impact.
- Reduce, recycle and manage waste.

Sample Strategies:

- Conduct on-site recycling.
- Implement a construction waste management plan.
- Minimize toxins in materials.

- Specify certified wood and bio-based materials.
- Use biological wastewater treatment systems.
- Specify recycled content.

3-2.5 Indoor Environmental Quality

Objectives:

- Eliminate the sources of indoor pollution.
- Provide for thermal comfort of occupants.
- Provide for occupant connection to outdoors.

Sample Strategies:

- Conduct on-site recycling.
- Limit indoor air pollutants.
- Specify low-emitting materials.
- Incorporate lighting controls.
- Create a natural indoor environment.

3-3 FEDERAL GOALS

3-3.1 Energy Policy

The sustainable design and development should adhere to the efficient energy management goals and objectives stated in Executive Order (EO) 13423. Building energy efficiency goals must exceed ASHRAE Standard 90.1-2007, Energy Standard for Buildings Except Low-Rise Residential Buildings by 20%. The Energy Independence and Security Act of 2007 (EISA 2007), Section 431 increased the federal energy reduction goal from 2%/year to 3%/year by fiscal year 2015. All MILCON projects must install Advanced Utility Meters for electrical, natural gas, water and steam applications.

3-3.2 Environmental Initiatives

The sustainable design must meet or exceed the waste prevention, recycling, and Federal acquisition goals and objectives stated in with guidance in UFC 1-900-01, Selection of methods for the Reduction, Reuse, and Recycling of Demolition Waste and Unified Facilities Guide Specification Sections, UFGS-01355, Environmental Protection; UFGS-01572, Construction and Demolition Waste Management; UFGS-02220, Demolition. Apply where possible the *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings*.

3-3.3 Environmentally Preferred Products

Environmentally preferred products (EPPs) reduce effects on human health and the environment. Products are designated as EPPs after a product assessment based on their raw materials source, production, manufacturing, packaging, distribution, disposal, and recyclability. All selected materials are also required to meet industry standards for durability and cost effectiveness based on an LCCA. The comprehensive guidelines can be obtained at (epa.gov) website.

3-3.4 Facility Equipment

All facility equipment, materials, and operating systems should be based on consideration of the lowest life cycle cost analysis (LCCA) and AR 11-27, the State's energy code, ETL 1110-3-491, and the latest energy and environmental industry standards.

3-4 SPECIFIC APPLICATIONS

3-4.1 General Goals

All facility equipment, materials, and operating systems should be based on the lowest life cycle cost considerations, AR 11-27, the State's energy code, UFC 3-400-01 Energy Conservation and the latest referenced energy and environmental industry standards.

3-4.2 Passive Solar Energy Conservation

The design and orientation of functional areas should in new construction and where feasible in major additions/renovations, make use of the principles of passive solar energy design. Specific passive solar features, however, must be justified on a life cycle cost basis, demonstrating a payback in 20 years or less in order to obtain Federal support. Buildings should be located to best utilize the winter sun day-lighting and warmth, prevailing winds for ventilation, and natural landscape. Refer to *UFC 3-440-03N, Passive Solar Buildings* for design guidance.

3-4.3 Plantings

Landscaping and planting should be integrated appropriately into the design to provide shade from summer sun and to block winter winds. All landscape features should be adequately described for cost estimating proposes. All plant selections must coordinate with all antiterrorism force protection (AT/FP) goals of the site.

Landscaping can reduce direct sun from striking and heating up building surfaces. It can reduce reflected light carrying heat into a building from the ground or other surfaces. The shade created by trees, along with the effect of grass and shrubs can also reduce air temperatures adjoining the building and provide evaporative cooling. The landscape design should also incorporate water conservation principles.

3-4.4 Building Envelope

The building envelope consists of all architectural elements that define the exterior shell of the building. All heated and cooled building roof assembly must have a calculated *U*-

factor ($1/R_t$) of 0.025 and wall assembly must be 0.038 Btu/h/SF/F. Features include the following:

3-4.4.1 Wall and Roof Insulation

The design of the exterior envelope should optimally promote energy-efficient performance guidance in the 2005 Edition ASHRAE Handbook of Fundamentals. In doing this, the design should show that it satisfies the mechanical/HVAC calculations for envelope values submitted at the 65 percent level of design completion. The design professional should specify Cool Roof™ Systems certified by the Cool Roof Rating Council where possible.

3-4.4.2 Doors and Windows

Openings should be sized and located to balance energy conservation and the need for natural daylight. High-performance windows with efficient insulated glazing should be considered (*RE: Efficient Windows Collaborative @ www.Efficientwindows.org*) yet carefully matched to the wall thermal performance level based on HVAC heat load calculations for envelope values, including solar gain. Air infiltration should be carefully analyzed and reduced wherever possible.

3-4.4.3 Vestibules

Air locks or vestibules should be provided at the main entrance and at all corridor exits leading to privately owned vehicle (POV) parking if the facility is located in a climatic zone with a winter design temperature less than 20 °F db and summer temperature greater than 75 F wb.

3-4.4.4 Earth Embankments and Berms

Embankments and berms may be used where appropriate, provided such usage does not involve an excessive amount of retaining wall type of construction. Federal support is not authorized for retaining wall construction at the toe of the embankment (for example, where the toe of the berm is above the adjacent finished grade).

3-4.4.5 Weather Stripping and Caulking

Weather stripping and caulking shall be used to reduce air infiltration.

3-4.4.6 Building Configuration and Mass

To reduce heating and cooling costs, the building shape should result in as low an exterior surface and mass as practical and economical.

3-4.4.7 Selection of HVAC Equipment

Interior environmental equipment should be selected based on energy efficiency, including fuel sources. The use of variable air volume (VAV) system, ground source heat-pump systems, in-floor radiant heating and central heating/cooling plants for multiple facilities must meet the lowest life cycle cost for owning and operating.

3-4.4.8 Standard Building System Features

- A Utility Monitoring and Control System (UMCS) per UFGS-13801) or programmable timer with the capability to preset the appropriate temperature level for occupied and unoccupied usage of the various zones.
- Adhere to the Advanced Metering Program to meter at all buildings for water, steam, natural gas, and electric in accordance with the Energy Policy Act of 2005 and DOE/EE -0312 Guidance for Electric Metering in Federal Building (www.eere.energy.gov/femp).
- A temperature sensor to automatically shut off the heating system when the outside temperature reaches 65 °F for more than three consecutive hours.
- Door closers, where justified, on exterior and interior doors
- Operable (manual) windows
- Low-leakage dampers
- Entry Vestibules options in extreme climates.

3-4.4.9 Optional System Features

HVAC system features to consider, if economical, include the following:

- Multiple boilers
- De-stratification fans in Assembly Halls and maintenance Work Bays/Hangers areas
- Exhaust hoods that supply 80% untempered makeup air through an outer jacket of the kitchen exhaust hood (to exhaust only a limited amount of heated room air)

3-4.4.10 Domestic Hot Water

Domestic hot water heating plants should use natural gas, electric and supplemental solar panels where feasible. Other features should provide the following:

- Flow restrictors in shower heads
- Low-flow aerators in kitchen and lavatory faucets
- Separate water heaters for kitchen and small toilet areas serving full-time occupancy

- Outdoor temperature reset control for the water-heating systems may vary water temperature inversely with outdoor temperature.
- Solar water heating panels should be used where economically feasible in accordance with EISA 2007, Section 523.

CHAPTER 4

COMMON FUNCTIONAL SITE DESIGN GUIDELINES

4-1 SITE ANALYSIS EVALUATION

4-1.1 Area Suitable for Building Construction

The geotechnical investigation, the facility master plan development, and the conceptual-level site analysis process with regard to sustainable site goals should provide information clearly delineating the extent of the site area that is suitable for building construction in the initial phase of development and potential future expansion.

4-1.2 Compliance with Threat Assessment Criteria

All building complex designs should clearly indicate, to scale, the configurations of the exclusive and nonexclusive standoff perimeters on designated site plan drawings. Areas of potential building expansion should be considered when establishing standoff perimeters.

4-1.3 Urban Brownfield Redevelopment Site Selection

Select Urban Brownfield sites early in the master planning and site selection process for MILCON projects in the State/Adjutant Generals Long-Range Construction Plan (LRCP) to allow time for remediation. The U. S. Environmental Protection Agency (EPA) supports the States Brownfield and Voluntary Response Programs and their Voluntary Cleanup Programs (VCP) that promote cleanup and reuse. To review each State VCP reference EPA Brownfield State and Voluntary Response Programs at (www.epa.gov/cgi-bin/epaprintonly.cgi).

4-2 STORMWATER POLLUTION PREVENTION

4-2.1 Storm water Management Practices

The best management practices currently used in stormwater quality control includes Green Roofs/vegetative, wet and dry ponds, infiltration trenches, porous paving, and oil-grit separators. These practices have certain limitations and drawbacks. Therefore, the design A-E should carefully analyze their functional benefit and cost impact before incorporating them into the project.

Design goals are to minimize stormwater runoff by maximizing the infiltration of rainwater into groundwater and to reduce the concentration of undesirable chemicals in both groundwater and surface waters. The key to these efforts is to minimize the nonporous surface areas, which is consistent with sustainable goals for reducing the heat sink effect on site.

4-2.2 Bio-retention Ponds

Bioretention ponds may be used at most ARNG facilities. These small, inexpensive, and somewhat isolated improvements combine the absence of paving (which allows ponding and eventual infiltration of water) with the uptake and chemical conversion of some pollutants by bacteria adsorbed onto the roots of selected plant species. Often, these bacteria are the best method to reduce the concentration of nitrogenous chemical species and phosphates in surface water.

4-2.2.1 Standard Reference for Small Watersheds

The standard reference, TR-55, Urban Hydrology for Small Watersheds, contains technical calculations for bioretention ponds. TR-55 serves to determine the amount of storage required to mitigate the impact of urbanization, including parking lots.

4-3 REQUIRED PAVED AREAS

Three Army National Guard facilities require large expanses of paved areas:

- Mobilization and training equipment sites (MATES)
- Combined support maintenance shops (CSMS)
- Army aviation support facilities (AASF)

Rigid concrete pavement and or Resin Modified Pavement™ are authorized for all parking surfaces. However one option is to maximize the use of crushed stone or hardstand in lieu of pavement at maintenance facilities for ground vehicles. This material permits rainwater infiltration and recharge into the groundwater. Its usefulness decreases to the extent that the ground is compacted prior to emplacement, because the compacting reduces porosity and therefore permeability to rainwater. At AASF facilities, however, crushed stone is not an option, given the justified concern over rotor and prop wash kicking small particulates such as stones or dust into aircraft engines. For AASF Aircraft parking a Resin Modified Pavement™ or rigid concrete material must be specified.

4-4 FUEL STORAGE AND DISPENSING SYSTEM

Any fuel storage or dispensing facility must be designed in accordance with guidance in MIL-HDBK-1022A and with the State's Department of Environmental Quality, EPA, and local regulations. Fuel storage may be either above or below ground. Above-ground storage tanks should be concrete encased. Placement of tanks in proximity to buildings should take into account fire protection codes, including NFPA 30, or should be fire-rate tanks accordingly. Fuel-dispensing units for the direct fueling of ground vehicles should be in accordance with standard MIL-848-2 and should have an output capacity no greater than 26 gpm. The pump should be located in the dispensing unit rather than the dispensing tank. Special approval is required for high-speed, large-capacity units involving multiple dispensing systems and a pump located in the tank. The pump should be located in the dispensing unit rather than in the dispensing tank. In addition

to fueling individual vehicles, the system must be equipped for bottom-loading tank trucks and trailers. The system should meet all Federal, State, and environmental regulatory requirements.

In accordance with *Army Regulation (AR) 70-12 Fuels and Lubricants Standardization Policy for Equipment Design, Operation, and Logistic Support*, all plans for new construction, modification, or upgrading of petroleum facilities containing fuel purchased with federal funds must be submitted prior to bidding for review and technical assistance to:

U.S. ARMY PETROLEUM CENTER (APC)
Facilities and Operations Division
8725 John J. Kingman Road, Stop 6421
Fort Belvoir, VA 22060-6241

Questions related to fuel-dispensing systems can be answered by calling the APC at:

- (703) 767-0646 or DSN 427-0646
- (703) 767-0648 or DSN 427-0648

4-5 **CONTROLLED WASTE-HANDLING FACILITY**

The controlled waste-handling facility should be a separate building constructed of noncombustible materials. It should be in close proximity with flammable/combustible storage and bulk POL storage. As a hazard, it should be located at the appropriate distance from other buildings in accordance with fire safety and building codes applicable for the State, such as NFPA 30 and the IBC. The facility should be within a secured compound and located to minimize the impact of contamination by accidental surface runoff. A prefabricated structure may be used. A 6-ft-high chain link fence or permanent partition should be designed within the enclosure to separate the various types of controlled waste. The latest Federal and State environmental agency waste management requirements for controlling waste should be followed.

A single-point grounding system shall be used to ground flammable materials in metal containers. It should be wired in series to the ground point, with an anchor bolt installed in the concrete floor for each separate, segregated area within the enclosure. Fire protection systems, explosion relief construction, air conditioning, and heating are not authorized unless required by the type of waste stored. Adequate ventilation should be provided at the edge of the concrete slab and the walls to prevent spontaneous combustion of escape fumes from material storage containers. If the roof is flat or nearly flat, a continuous ridge vent or other roof-top ventilation should be provided.

The controlled waste-handling facility should have one personnel door, one 6-ft-wide by 10-ft-high overhead coiling door for forklifts, and one 6-ft-wide by 8-ft-high overhead coiling door for non-forklift operations. The floor should be constructed of reinforced

concrete and must have a chemical and moisture-resistant seal (such as an epoxy-based system) with liquid-tight, chemical-resistant joint sealants at any floor joints. It should have a spill/leak containment raised edge. The slab reinforcement design must resist cracking to prevent leaks in the floor containment membrane and to support the loads from stored materials. The design A-E must comply with environmental regulations regarding containment sump capacity.

4-6 **COVERED (ENCLOSED), UNHEATED VEHICLE AND PARTS STORAGE**

Covered, unheated vehicle storage and parts spaces should be sized according to the program documents. The facility should have one personnel door, one 6-ft-wide by 10-ft-high overhead coiling door for forklifts, and at least one overhead coiling door for vehicular operations, with additional vehicle doors as the size of the facility dictates. Doors must be sized for vehicle access according to vehicle clearance requirements, and protection for door edges should be provided.

4-7 **COVERED STORAGE AREA**

Covered storage areas should be sized according to the program documents. Vertical maneuvering clearance should be 14 ft clear height, measured at the one-third point of the underside of the lowest sloping roof structural elements. The covered area may be enclosed when indicated in the program documents. The design should incorporate a super-flat reinforced concrete slab suitable for high-stack forklift traffic and load support.

4-8 **WASH PLATFORMS FOR VEHICLES/EQUIPMENT**

Wash platform sizes depend on the type of vehicles to be washed. Generally, the minimum standard-sized platform is 25 ft by 40 ft. Wash platforms should be equipped with settling basins prior to discharge to trap grit, and with an oil and grease interceptor in accordance with all environmental requirements in Federal, State, and local codes. The water supply should be sufficient to provide a flow of 40 gpm at 40 psi at each hydrant.

4-9 **BULK POL STORAGE**

Consolidated above-ground, liquid bulk storage of new petroleum, oils and lubricants generally requires temperature and ventilation control. It should be next to the Controlled Waste Handling areas and close to the Flammable/Combustible Storage area; but isolated from all other shops and storage rooms.

4-10 **FLAMMABLE MATERIALS STORAGE**

Consolidated storage of bulk solid flammable materials (not fuels). It is generally unheated, and requires ventilation. It should be next to the Controlled Waste Handling areas and close to Bulk POL Storage, but isolated from other shops and storage rooms.

The flammable materials storage (FMS) building may be a separate prefabricated metal building or constructed of concrete masonry units (CMU) or the same material as the main building as long as the design meets all Federal, State, and local codes, regulations, and ordinances. If designed as part of the main building, the FMS should have an exterior door and may have an interior automatic self-closing noncombustible

fire door, and the entire storage area must be surrounded by a liquid-tight 4 in. high curb. A roof- or wall-mounted exhaust fan and a wall or door louver near the floor should be provided to prevent hazardous vapor from accumulating within the area. If the FMS is located in a separate building it is generally not heated and is considered a Class 1, Division 1 hazardous location for electrical work. The net floor area can be obtained from the approved program documents. The FMS may be equipped with metal shelves. No floor drain is to be provided. If the interior area is to be separated for item or organizational control, an industrial wire mesh partition may be provided.

CHAPTER 5

COMMON FUNCTIONAL PLANNING AND BUILDING DESIGN GUIDELINES

5-1 FUNCTIONAL PLANNING RELATIONSHIPS

All functional site and building design components should respect fundamental planning relationships that optimize efficient operations at Army National Guard facilities.

Each facility-type design guide, used in combination with this document, includes specific information related to the topics discussed in the following paragraphs.

5-1.1 Proximity

All program functions listed in NG PAM 415-12 for each facility type have priorities of functional proximity to one another. Some should be adjacent because of functional co-dependence, and others isolated because of incompatibility.

Each facility-type design guide includes adjacency matrices related to all functions to be located in the facility. In addition, functional relationship diagrams, which delineate each function in proportional scale, are included to assist the design A-E. These diagrams are not intended to establish conceptual design direction but to assist in the functional comprehension process.

5-1.2 Expandability

The location of those functions with the greatest potential for future expansion warrants careful consideration. Such functions should be placed either at the building perimeter, allowing incremental growth in a new addition, or adjacent to flexible use areas that can be converted into additional dedicated functional space. Facility expansion should be considered in establishing AT/FP standoff zones. All designs should accommodate 25% expansion without affecting the initial AT/FP standoff zones.

5-1.3 Special Environmental Requirements

Unique space environmental factors to consider during the space planning process include:

- Height requirements
- Noise and vibration isolation
- Requirements for utility support
- Public versus secure spaces
- Code-required fire separations

5-1.4 Access to Natural Light

The location of classrooms and open administrative areas should maximize exposure to natural light.

5-1.5 Service Efficiency

Common service functions, including toilet facilities and mechanical and electrical rooms should be grouped horizontally and vertically. The design should provide adequate space for servicing and replacing mechanical and electrical equipment. Where possible in new construction and major renovation locate mechanical/electrical rooms on outside walls to allow unrestricted equipment service and replacement activities.

5-2 GENERAL BUILDING CIRCULATION

The circulation area authorization in the program documents is for inter-functional use only. The individual functional space allowances include intra-functional circulation. The designer should layout the building spaces in the most efficient manner with the smallest ratio of circulation space/occupied space.

5-2.1 Direct Routes

Circulation areas should provide direct access to functional spaces without the use of offsets or elaborate circulation patterns.

5-2.2 Corridor Width

Corridor width should be based on the anticipated use but should not exceed 6 ft, unless required by the calculated exit width as determined by building codes (or NFPA 101). The minimum clear width is governed by means of egress sections of these codes.

5-2.3 Lobby Requirements

The building should have only one lobby that is easily observed from the adjacent functions.

5-2.4 Vertical Circulation

Stairways should be strategically located adjacent to corridors. Elevators are authorized for all two-story facilities to allow access and freight handling between floors.

Stair placement must be evaluated as part of the means of egress travel distance limits, dead-end limitations, and exit discharge requirements in the codes.

5-3 APPROPRIATE BUILDING MATERIALS

The Army National Guard has extensive experience resulting in lessons learned relative to the durability of both interior and exterior building materials. Exterior building materials should comply with the performance guidelines presented in Chapter 6, Common Architecture and Engineering Technical Guidelines. Each facility-specific design guide contains tables of generic architectural interior finish materials. These represent performance level expectations; alternatives with the same characteristics may be considered for use.

5-4 **HVAC, ELECTRICAL, AND TELECOMMUNICATIONS SYSTEMS**

During the entire development of the building design, it is important to maintain a focus on the design intent related to fundamental environmental, electrical, and communications systems. Emphasis should be on indoor air quality, energy, efficiency, flexibility of needs, and adaptability for future technological advancement. The size of the mechanical, electrical, and telecommunication room(s) depends on the geographic location as well as the amount and size of the actual equipment needed to provide the heating, ventilation, and air conditioning (HVAC), electrical, and telecommunications support for the entire building. The floor plan layout, drawn to scale and showing the required equipment, should justify the actual floor space required. The building mechanical, electrical, and telecommunications equipment should be housed in separate rooms with direct outside access where possible. The telecommunications room should be environmentally controlled to protect the equipment from overheating.

5-5 **FACILITY MAINTENANCE AND CUSTODIAL AREA**

The facility maintenance and custodial area should be located on an outside wall to allow direct access for taking equipment and supplies in and out for maintenance and upkeep. The design may include wood or metal shelving attached to the floor and installed along one wall. One custodial room may be provided per floor. Each should have one mop sink, shelving on the wall, and a wall-mounted broom and mop rack.

5-6 **REGIONAL CONSIDERATIONS**

ARNG facilities are constructed in very diverse climates. The design A-E must research the proposed materials and systems in detail to verify their appropriateness, particularly related to the building envelope. Consideration should include durability to the elements and availabilities, particularly in remote locations. Reference *UFC 3-440-05N, Tropical Engineering* for ARNG Tropical Regions for (Southern Florida, Hawaii, Guam, Virgin Islands and Puerto Rica) planning, design and construction. Reference *UFC 3-130-07 Arctic and Subarctic Construction for Buildings* for ARNG Cold Regions facilities.

5-6.1 **Mechanical Systems**

In tropical and semi-tropical climates, mechanical cooling should be considered in storage areas as well as occupied portions of the building. Regions that experience long periods of high humidity may require dehumidification, not only for human comfort but also to avoid damage to stored equipment and supplies. Analysis should be performed before airside economizers are selected, as they are frequently not cost effective in hot, humid climates. Intense sun may justify external sun shades on windows. Mechanical system protection from tropical storms should be considered.

In extremely cold climates, heating is required in almost all building areas. Special attention must be given to the potential freezing of pipes located in outside walls, stairways, or any unoccupied area. Outside air intakes and exhaust outlets must be protected from snow accumulation. Intakes ducts and coils must be designed to avoid ice accumulation and to dispose of water resulting from melting ice. Glycol solution

should be used in preheat coils to avoid coil freeze-up, and special care must be exercised to ensure proper mixing of outside and return air at AHU inlets. Some form of perimeter heating, such as baseboard radiation, should be considered. Standby boilers, pumps, and other equipment should be provided to prevent building freeze-up in the event of major equipment failure.

5-6.2 Architectural Considerations

Observation and recognition of the reasons for certain materials being favored locally assists the design A-E in evaluating materials that are intended to reflect this knowledge. The design A-E is encouraged to adopt the same practical approach to selecting materials that reflect the community environment. The design A-E is cautioned to avoid introducing materials inappropriate to a climatic region.

The following are some examples of impacts on design resulting from environmental and climatic extremes:

- Ground moisture content, which may have an impact on slab design and elements below grade
- Dew point/condensation management in extremely cold climates or in spaces that change from conditioned to unconditioned based on use (and thermal breaks in insulated window units to prevent condensation/frost in cold climates)
- The position and type of the air retarder, vapor retarder, waterproofing, and dam-proofing in exterior walls and roofs in climatic extremes
- Perimeter below-grade insulation in extremely cold climates
- Piled (plowed) snow and ice against the perimeter of the building, and de-icing chemicals and water/slush ice tracked inside
- Fenestration and other shading considerations in very hot climates
- Alkaline content of soils, which may have an impact on concrete and reinforcement
- The effect of extreme temperature differentials on movement isolation and movement control joints, particularly masonry
- Drifting snow against edges of the building in cold climates, along with snow loads on the roof related to structural design

5-6.3 Areas of Seismic Extremes

Structural engineering design requirements for areas of seismic extremes are provided in the International Building Code, Structural Design and UFC 3-310-04 Seismic Design for Buildings. In addition, the design A-E should ensure that ceilings and ceiling-hung/structurally supported elements are braced, particularly in assembly areas, and that elevator hoist-ways have proper tolerances.

5-6.4 Areas of Wind Extremes

In areas subject to extreme wind conditions, structural design should be based on the most stringent requirements of the IBC or local building codes and regulations. The design A-E should consider persistent wind effects in cold climates on door entries, door closer operation, and glazing unit design.

5-7 COMMON FACILITY FUNCTIONAL AREAS

The following functions have the same design guidance for inclusion in all facility types.

5-7.1 Break Room (Area)

The break room space should be conveniently located for the majority of the building occupants and contain a vending area. The location needs to be acoustically isolated or remote from areas needing a quiet environment. It should include vending machines plus tables and chairs in the amount appropriate to the size of the facility.

5-7.2 Toilets and Showers

The approved program documents should indicate the number of designated males and females in order to proportion the authorized space appropriately. The appropriate plumbing code should be used to determine the specific number of each type of plumbing fixtures.

5-7.3 Physical Fitness Area

The physical fitness area is used on a daily or weekly basis for physical training and requires construction to withstand the impact of furnished exercise equipment. The area should be located at an appropriate distance from administrative and classroom functions for acoustical reasons. The physical fitness machines and equipment are classified as portable equipment to be purchased through standard supply channels, not with Federal construction funds.

5-7.4 Mail Room

Mail room is a facility operated by or for the National Guard/Department of Defense (DOD) for the receipt and delivery of mail for military units or other authorized organizations and agencies by entities outside the National Guard/DoD. This does not include mail rooms that receive mail distribution that was initially received at a central DOD mail handling facility.

Mail rooms in inhabited facilities should comply with the minimum design standards as addressed in the Unified Facility Criteria (UFC) 4-0101-01. The following are some of

the minimum anti-terrorism design standards for mail rooms addressed in the UFC 4-010-01:

- Locate mail rooms on the perimeter of the building.
- Locate mail rooms as far from heavily populated areas of the building and critical infrastructure as possible.
- Ensure that mail rooms are well sealed between their envelopes and other portions of the buildings in which they are located to limit migration into buildings of airborne chemical, biological, and radiological agents introduced into mail rooms.
- Provide separate, dedicated air ventilation systems for mailrooms to ensure airborne chemical, biological, and radiological agents introduced into mailrooms do not migrate into other areas of buildings in which the mailrooms are located.
- Provide dedicated exhaust systems within mailrooms to maintain slight negative air pressures with respect to the remainder of the buildings in which the mailrooms are located so that the flow of air is into and contained in the mailrooms.

5-7.5 Nursing Mothers Room

All ARNG facilities that include Administrative Areas are authorized a net area of 80-square feet enclosed room with complete environmental systems and one cabinet/counter mounted 16"x16" stainless steel service sink to support this effort. For information on State Breastfeeding Laws or Civil Codes refer to the National Conference of State Legislatures website: (ncsl.org/programs/health/breast50.htm).

CHAPTER 6

COMMON ARCHITECTURE AND ENGINEERING

TECHNICAL GUIDELINES

ORGANIZED BY Construction Criteria Base, (CSI MasterFormat™ 2004 Edition) Unified Facilities Guide Specifications (UFGS) (USACE, NAVFAC, AFCEA & NASA) Whole Building Design Guide: (www.wbdg.org/ccb/browse_org.php.)

SECTION 1 CIVIL, SITE, AND LANDSCAPE DESIGN

DIVISION 01 GENERAL REQUIREMENTS

Sustainable Site Development Goals

The major site development objective is to preserve the character of the site by retaining natural features such as ground slopes, drainage patterns, trees, and other natural vegetation to the greatest extent possible. The design A-E should analyze the site to locate and orient the building and other structures so they are compatible with natural site features, sun orientation, and prevailing winds. The overall site design should conserve energy, allow easy access to public roads and utilities, and support the most efficient operation. Careful consideration should be given to future expansion of the facility during development of the initial design.

Site Preparation

Site preparation should include the work for demolition and clearing, grubbing, stripping, stockpiling topsoil, excavation, and rough grading. It should not include the excavation and backfilling required for foundation walls and footings nor the finish shaping and proof rolling of the subgrade under pavements and floor slab construction. The subgrade should be such that the cut and fill are roughly balanced to provide the most economical site preparation. If required, demolition should include removal of all surface features in conflict with the new construction as well as underground utility lines and structures. The design A-E shall prepare a suitable stormwater pollution prevention plan (SWPPP) and obtain the National Pollution Discharge Elimination System (NPDES) permit during the construction and post-construction phases in accordance with local requirements.

Environmental Protection - UFGS 01 57 20.00 10:

Storm Water Pollution Prevention Measures - UFGS 01 57 23:

Construction and Demolition Waste Management - UFGS 01 74 19:

Recycle/Recovered Materials - UFGS 01 62 35:

Demolition - UFGS 02 41 00:

Removal and Salvage of Historic Building Material - UFGS 02 42 91:

Clearing and Grubbing - UFGS 31 11 00:

Earthwork - UFGS 31 00 00:

Excavation and Backfill - UFGS 31 23 00:

Subsurface Drilling, Sampling, and Testing - UFGS 02 32 00:

Soil Surface Erosion Control - UFG 31 32 11:

During the construction phase, the appropriate control measures (such as straw bales silt fence, sediment traps, sediment basin, and other approved practices) shall be employed to minimize erosion in order to comply with the latest environmental and State requirements.

Utilities - General Information

All building utility service lines should be underground where possible. The design A-E should verify that all utility services will be available at the site when the intent is to connect with or extend an existing municipal system. The design A-E shall comply with and obtain approval with respect to all municipal requirements. The contract documents should stipulate that the contractor is to coordinate with local utility companies on the division of work to the extent necessary to ensure that when the facility is complete, all utility services will be connected and operational without further cost. The Federal share of the total cost of all utility service connections must not exceed 15 percent of the Federal share of the building cost. Exposed utility components and light standards may have bumper guards or posts if a location outside the vehicle traffic area is not feasible. Emergency power may be provided when sewage lift stations are necessary. The length of the service line for each utility is limited to the distance of the shortest run from the point 5 ft outside of the building to the property line adjacent to the public right-of-way.

Potable Water

Water Distribution - UFGS 33 11 00

Ductile-Iron pipe and fittings, PVC, Type K copper for a line size of 2 in. or less in diameter or an equivalent pipe should be used for the service connection, unless specific circumstances require the use of some more expensive material. If a public water system is not available in the general area, a well may be utilized if consistent

with the requirements of the local authority having jurisdiction. Line extensions 6 in. or more in diameter should be ductile iron or plastic.

Fire Protection

The design A-E should consider the size of the structure, type of construction, and exposure to fire hazard that the structure creates or receives from nearby buildings. The fire apparatus access requirements should be considered as well as the exterior fire rating of nearby buildings on site and the building being designed. Except in cases of conflict with State requirements, exterior fire protection should be in conformance with NFPA and UFC 3-600-01 Fire Protection Engineering for Facilities.

Sanitary Sewage Systems - UFGS 33 30 00

Piping should be vitrified clay, concrete, corrugated metal, PVC, or of equivalent quality and cost, unless special circumstances require the use of a more expensive material. The sewer should be gravity type. If a municipal system is not available in the general area, a packaged sanitary treatment system or septic system may be utilized.

Natural Gas Distribution - UFGS 33 51 15

Normally, natural gas is the fuel of choice if available at the site. Piping material should be vinyl clad Schedule 40 black steel or thermoplastic gas pressure pipe and fittings conforming to American Society for Testing and Materials (ASTM) D2513.

Stormwater Retention Basin Design

The design should separate normal stormwater sheet flows (from roofs or other areas) from possible contaminated stormwater sheet flows (occurring at military and POV parking areas). Non-contaminated flows should be designed to run off downstream from contaminated sheet flows. Contaminated sheet flow management (including retention basins, grit interceptions, and oil-water separators) is authorized for Federal support if required by the approved SWPPP and the NPDES permit (based on 1-hr rainfall during a 10-year event and on the local limitations thresholds imposed on such effluents). Designers should reference EPA 841-B-09-001 Technical Guidance on Implementing Stormwater Runoff Requirements and UFC 3-210-10 Low Impact Development Manual.

Privately Owned Vehicle Parking - UFGS 01 50 00

The authorized amount of paved area for circulation and parking is based on 35 yd² per parking space. If on-street parking is available, the area allocation may be reduced to the size of the parking space meeting local zoning ordinances. Paint striping may be used to define individual parking stalls, but stalls shall not have identification marking except for the physically disabled if a competitive employee position is authorized.

Concrete curbs may be used around the pavement edges. Designers should reference UFC 3-210-10.

Additional Paved Area Requirements - UFGS 32 13 13.06

The designer should incorporate additional areas of pavement for vehicular access to a wash platform or fuel-dispensing facility, or both, if authorized, in the military parking or storage area. A security fence should enclose these additional areas of pavement along with the platform or fuel facility, or both.

Bituminous Concrete Pavement - UFGS 32 10 00

Resin Modified Pavement™ Surfacing Material - UFGS 32 12 18

Access Roads and Entrance Roads - UFGS 32 13 13

The design A-E should consult the approved program documents for the authorized amount of paved area. The number of square yards of pavement stated in the approved program documents is only approximate; the actual amount will be as needed to provide the shortest runs possible when considering site conditions and economical locations of the building, dock(s), parking, and existing roads. The primary access or entrance road may be 24 ft wide, with rigid or bituminous concrete curbs, provided that an underground drainage system is avoidable. Secondary access roads, service drives, and circulation lanes in parking areas are limited to a width of 20 ft.

The design should provide an adequate turning radius based on the types of equipment driven or towed. Secondary access roads and service drives should not have curbs unless dictated by the most economical storm drainage solution. The authorization of paving for the parking areas includes paving for circulation lanes.

Pavement Standards - UFGS 32 10 00

A rigid pavement section should consist of a 6-in. or 8-in. concrete slab with shrinkage or temperature-welded wire mesh steel. The 6-in. thickness applies to wheeled vehicles, and the 8-in. thickness applies to tracked vehicles. Generally, concrete should be placed directly on a compacted subgrade, unless existing soil conditions dictate an aggregate base (a thickness of 6 in. maximum). An alternative to the rigid pavement section is to use roller-compacted resin modified pavement. If the design A-E determines that local soil conditions necessitate a more costly paving section, special justification is required before Federal support can be obtained for the additional paving cost.

02751 Military Vehicle Parking Pavement Requirements

The designer should consult NG PAM 415-12 for the area and type of paving to provide for military vehicle parking. The area includes space for parking the vehicles and

circulation. The paving should consist of Portland cement concrete, and the design should be based on soil conditions and on the maximum loads anticipated but should in no case be less than a 4,000-lb wheel load and 40-psi tire pressure.

02761 Fuel Truck Parking

Fuel truck parking containment is required and overhead protection is allowed. When more than one fuel truck is authorized, a spacing of 10 ft should be maintained between vehicles when parked.

02754 Trash Container Pad

A concrete pad may be provided at an appropriate location for storage of a truck-operated trash container. The selected location may take into account the ease of access by building users, visibility, and access for dumping and removal (the location generally is not inside the fenced compound). Screening may consist of walls or plantings.

SECTION 2 EXTERIOR IMPROVEMENTS

Concrete Sidewalks (Porous Asphalt) - UFGS 32 16 13

Walks connecting the primary and secondary building entrances to the parking area(s) and to the main vehicular access points should be porous asphalt. The maximum width may be 6 ft, except at the main entrance/flagpole location, where it may be 10 to 15 ft. The total area should not exceed the amount authorized in the program documents without prior approval from the Military Department or the CFMO. The designer should reference UFC 3-210-10 for permeable pavement design.

High Security Chain Link Fences and Gates - UFGS 32 31 13.53

The security-type fence must be a six (6) feet high, nine gauge, chain-link metal fabric with a twelve inch high, three strand four point barbed wire 45 degree anti-climbers to enclose the secured areas. Vehicle gate(s) may be swinging or rolling type. The following areas should be provided with security fencing: military vehicle parking; fuel storage and dispensing system; service and access aprons; aircraft parking; wash platform; lubrication and inspection rack; covered, unheated storage; cannibalization area; and loading ramp. Fencing should be located no more than 5 ft from the edge of the paved areas unless safety or security demands a greater distance.

Irrigation Systems - UFGS 32 84 24

If an irrigation system is proposed, it should be in the landscape budget. The designer should select an efficient landscape to reduce potable water consumption by using native or adapted plants, captured rainwater or grey water systems.

Fine Grading and Seeding - UFGS 32 92 19

The area within the limits of construction should be fine graded and seeded to provide proper site drainage and erosion control. The limits of construction should be clearly indicated on the project plans, and any damaged surface cover outside of this limit must be restored to its previous condition. The bottoms of drainage swales or ditches and embankment slopes steeper than 1 ft vertical to 4 ft horizontal should have sod instead of seeding. Banks steeper than 1 ft vertical to 3 ft horizontal should be stabilized with ground cover plants or with 3 in. of crushed aggregate. Steep slopes should be held to the absolute minimum and selected only when most economical. Importation of topsoil is authorized if the existing topsoil is insufficient to provide adequate cover.

Exterior Plants - UFGS 32 93 00

Plantings should include the furnishing and planting of new trees, shrubs, ground cover (other than sodding or seeding), irrigation systems, fertilizing, mulching, staking, erection of temporary barriers, watering, and general maintenance operation required to establish healthy growth after transplanting.

Landscaping - UFGS 32 05 33

The designer should include plantings as an integral part of the project planning and should clearly indicate the location, size, and quantity on the plans for bidding purposes. The planting design shall be simple and orderly, using a minimum of plant types and materials for framing and background aesthetics of the building and the screening of service areas, parking areas, and other objectionable views. Solar orientation, plantings, and berms should all be considered during early stages of design. Plant and tree selection should provide permanent low-maintenance vegetation appropriate to the location. Selected plant material shall be of local, hardy species that are tolerant of site-specific conditions. The design A-E should consider adjacent structures to prevent adverse impact. Trees should be carefully selected and located to prevent clogged gutters and drains from leaves and seeds and blocked sewer lines from root infiltration. Topsoil should be 4 in. thick unless there is a surplus from on-site project excavation grading.

In addition to aesthetic values, landscaping provides an opportunity to enhance the energy efficiency of the facility. Refer to Chapter 3, Sustainable Design.

SECTION 3 STRUCTURAL ENGINEERING DESIGN

GENERAL REQUIREMENTS

General Information

The structural system of the building should consist of noncombustible materials or heavy timber-type construction. The construction should generally be of open-web steel joists or prefabricated light-gage steel trusses supported on masonry bearing

walls, tilt-up concrete, or steel wide-flange beams or joist girders and columns. Pre-engineered metal buildings are acceptable where economically feasible.

Structure Height

The designer should keep the building heights to a minimum to reduce construction and operating cost. The interior height from the finished floor to the bottom of the roof structure system (or upper floor structure) should not exceed the limitations stated in each facility-type design guide (plus or minus 4 in. to accommodate masonry courses). Where the roof structure is sloping, the clearance is to be measured at the lower end of the one-third point of the triangle formed by the sloping roof arrangement. Care shall be taken to maintain the maximum authorized clearance at the one-third point. To accomplish this when longer spans are required, the design A-E can reduce the slope. The limit of the slope reduction is the minimum that the manufacturer recommends in order to achieve a roofing system that is warranted for 15 to 20 years.

Seismic Design Considerations

The design and construction of all new buildings located in areas of high probability of seismic activity must be in accordance with the International Building Code Section 1910, Seismic Design Provisions. The designer must reference UFC 3-310-04 Seismic Design for Buildings.

Division 03 CONCRETE

03200 Concrete Strength

Compressive strength should generally be 2,500 to 3,500 psi at 28 days after placement, unless a stronger concrete is justified by the unique technical requirements for a building type and identified in the facility-type design guide. All concrete related work must be in accordance with the latest recommendations of the American Concrete Institute. For extreme conditions such as cold climates, deicing chemicals and sulfate-containing solutions refer to the International Building Code Chapter 19.

31 60 00 Foundations

Bearing wall foundations may be CMU (with the core filled and grouted) or reinforced concrete foundation walls on continuous concrete spread footings as a standard. (The standard for columns is spread footings.) Special foundations include wood, steel, or concrete piles; concrete grade beams may be used if required by the soil investigation survey and justified by a Declaration of Uniformity of Area Soil Conditions. The top of the interior bearing wall and column footings should generally be 6 to 8 in. below the bottom of the floor slab. The bottom of the exterior bearing wall and column footings should be just below the maximum frost depth or 1 ft 6 in. below the outside finished grade, whichever governs. Footings should be lower where required for plumbing and other underground utilities, including risers at the column footings. For entrances in

cold climates, the designer may consider the use of foundations or grade walls under concrete stoops (which are almost flush with the bottom of the doors) to prevent door interference due to upward displacement of the stoop by frost action.

03000 Slabs on Grade

The slab should be poured in a single layer, with non-galvanized shrinkage and temperature steel placed at mid-point of the slab thickness on no more than 6 in. of granular base, and surfaced with a standard troweled finish. Generally, a 4 in. slab thickness and temperature-welded steel wire mesh are adequate except for special areas and uses indicated in the individual facility-type design guides. Instead of welded wire mesh, the design A-E may consider fibrous concrete. A steel angle or other type of protection may be used to protect the concrete edge of a vehicle access door threshold.

SECTION 4 ARCHITECTURAL DESIGNS

GENERAL INFORMATION

WHERE DESCRIBED IN THESE DESIGN GUIDES AND REFERENCE PUBLICATIONS, THE STANDARDS FOR MATERIAL QUALITY AND CONSTRUCTION ARE THE MINIMUM REQUIRED TO SUPPORT FEDERAL FUNDING FOR A PROJECT. THE USE OF CONTRACTOR OPTIONS AND PERFORMANCE-TYPE SPECIFICATIONS IS ENCOURAGED. THE BUILDING MUST BE OF NONCOMBUSTIBLE CONSTRUCTION, AND ALL MATERIALS MUST HAVE A FLAME SPREAD RATING OF 25 OR LESS IN ACCORDANCE WITH ASTM E84. REFER TO AR 190-51, APPENDIX D, FOR THE PHYSICAL SECURITY REQUIREMENTS FOR FUNCTIONAL AREAS STORING OR HAVING SPECIAL TOOLS, EQUIPMENT, OR REPAIR PARTS.

DIVISION 04 MASONRY

Parapet Walls - UFGS 04 20 00

Parapet walls, up to a maximum height of 18 in., are authorized. Where parapet walls are constructed of CMU, they should have a one-piece truss-type (industry standard) horizontal reinforcing element every second or third course. Vertical reinforcing should be used in seismic zones to comply with the applicable building code. The design A-E should pay special attention to eliminate differential expansion compared with walls below as indicated by movement in control joints.

Exterior Walls - UFGS 04 20 00

Where masonry is used in exterior walls the material may be face or common brick with CMU backup forming a bearing wall. A concrete tilt slab or other suitable system can be provided if the cost is equal or less. For non-cavity wall construction with CMUs at the exterior, the design A-E should consider whether a moisture-resistant film or other

barrier would assist in moisture control (with a non-bond-breaker type of barrier) and whether to permit or reduce moisture movement.

DIVISION 05 METALS

Miscellaneous Metals - UFGS 05 50 13

Lintels may be steel angles, masonry, or precast masonry units. The concrete edge of vehicular door openings shall have a steel angle or a similar type of protection.

Corrosion Resistance

The design must prevent corrosion and electro-galvanic activity under all dissimilar metal-to-metal and metal-to-alkaline material conditions.

DIVISION 06 WOODS AND PLASTICS

Wood Roof Support - UFGS 06 10 00

The roof system should normally consist of a lightweight, noncombustible type of construction. As an alternate, the structural system may be of heavy timber-type construction (defined as a minimum of 2-in.-thick decking and 6-in. by 8-in. minimum-size joists, purlins, and beams) when proven to be more economical than steel construction and where permitted by the building code.

DIVISION 07 THERMAL AND MOISTURE PROTECTION

Insulation

The exterior walls, penetrations, and roof should be insulated to reduce the heat transmission U-factor and energy cost in accordance with the State Energy Code or ANSI/ASHRAE/IESNA Standard 90.1-2007.

Slab Perimeter Insulation - UFGS 07 21 13

Perimeter insulation should be provided for slab-on-grade floors to reduce the U-Factor to the same as that of the exterior wall insulation. The insulation should be arranged to prevent an uninsulated gap at the wall and floor juncture.

Mineral Fiber Blanket Insulation - UFGS 07 21 16

The installation of batt insulation above suspended ceilings is not recommended due to the likelihood of creating a condensation problem. However, the roof insulation may be installed below the roof deck if this does not create a potential condensation problem.

Roofing Systems - UFGS 07 22 00

The roof system should normally consist of a lightweight, noncombustible type of construction. The roof construction may be any of the following:

- A composite built-up roof
(3-ply minimum and 4-ply maximum glass fiber felts)
- A single-ply membrane roof (ethylene propylene diene monomer [EPDM], ballasted, partially or fully adhered, or mechanically fastened)
- A standing seam metal roof

All roofing systems should be of a quality to have a twenty (20) year warranty. Proposals to use other roofing systems or slopes exceeding 3 in. per foot must be justified by an economic analysis. Walking treads may be provided if required to maintain roof-mounted equipment. Drainage should be toward the perimeter of the roof, with a minimum slope of ¼ in. per foot, into scuppers and downspouts discharging onto grade. Calculations of roof slope should allow for roof-supporting member sag to reduce ponding. Refer to the National Roofing Contractors Association [NRCA] Roofing and Waterproofing Manual.

Bituminous Roofing - UFGS 07 52 00

Where selected, built-up bituminous roof systems should be applied over rigid insulation for heated buildings. Metal decking with the appropriate corrosion protection on both sides may be used as the supporting substrate for insulated and uninsulated roof applications. The appropriate base sheets recommended by the manufacturer must be used for insulated roof applications. Condensation and the location of the dew point (such as at soffits) must be considered to prevent occurrence at the decking or the bitumen bond. Two-in. wood decking may be used as an alternate for such special conditions.

Elastomeric Membrane Roofing - UF-07530

The same recommendations apply as for built-up bituminous roofing.

Sheet Metal Roofing - UFGS 07 61 14.00 20

If standing seam metal roofing is selected, the authorization generally is for the less costly system using a galvanized or aluminized, painted metal roofing supported by metal purlins. The appropriate thickness of fiberglass batt insulation should be placed under the metal roofing and over the top of the purlin.

Roof Restraint Protection

Protection for service staff on the roof should consist of either an extension of the parapet, guardrails, or a tie-off system. The local OSHA office can provide the ruling on the appropriate method. Refer to OSHA standards regarding walking-working surfaces in 29 CFR 1910.21–1910.23 and regarding fall protection in 29 CFR 1910.23(c)(1)(c)(3) and 29 CFR 1910.132(a).

DIVISION 08 OPENINGS

Exterior Doors - UFGS 08 11 13

All exterior doors, including rollup doors entering into heated or air-conditioned areas, should be insulated. Exterior doors providing access to storage rooms for tool and repair parts and to supply rooms should be hollow metal with fixed pin hinges of suitable weight on a hollow metal frame. Main entrance doors and those connecting directly to POV parking areas may be incorporated into a vestibule, particularly in areas of climatic extremes. If the entrance doors lead to a major administrative area, they may consist of commercial-grade aluminum and glass store front systems. Secondary doors, which are generally for emergency egress only, should not be fitted with glass panels, transom glass, or sidelights for security reasons. Where required by code, panic hardware should be installed on all exterior exit doors. Only main entrance doors may have concealed door closers; all other frequently used doors should have surface-mounted closers. Ball bearing hinges should be used only for high-frequency usage doors or where fire safety governs. Kick and push plates may be installed on frequently used doors.

Wood Interior Doors - UFGS 08 11 00

Interior doors and frames should generally be hollow metal for durability. Kick and push plates may be installed on frequently used doors. Solid-core wood doors with a standard finish may also be used. Interior doors providing access to storage rooms for tool and repair parts and to supply rooms should be hollow metal with fixed pin hinges of suitable weight on a hollow metal frame. The use of wood doors is not encouraged in heavy traffic areas because wood is less durable than metal. Interior doors may be recessed when the occupant load, as identified by the building code, requires a door to swing outward into the direction of egress. Doors may have surface-mounted door closers. Closers are required by code at fire-rated doors.

Motor-Operated Doors

Motor operation is authorized for vehicle maintenance workbay doors, warmup bays, hangar doors, and the most frequently used United States Property and Fiscal Office (USPFO) warehouse overhead supply doors. Motor-operated overhead doors are not authorized for vehicle storage buildings, but chain-operated overhead doors may be used.

Door Sizes

Personnel doors may be 3 feet wide X 7 feet high. Double-leaf doors should generally have an astragal. The maintenance workbay/hangar door size is 28 feet high X 18 feet wide. Workbay/Hangar doors may be constructed of insulated panels or fabric type.

Logistics Maintenance/ Aviation Hangar Doors Steel sliding of vertical lift fabric doors may be used. - UFGS 08 34 16.10/20

Skylights and Clerestories - UFGS 08 62 00

The design A-E should consider a limited amount of skylights in a day-lighting scheme. Where high walls exist, clerestory windows shall be used instead of skylights to provide adequate natural light. Lobbies, warehouses, and interior windowless areas may have skylights.

Door Hardware - UFGS 08 71 00

Door locks should be heavy-duty mortise type, except that doors to rooms containing an arms vault shall have Government Series 86 (ANSI A115.1) dead bolt locks (Federal Specification FF-H-105). Offices and other non-security-type areas should have standard commercial passageway locks. For safety reasons, lock sets and locks normally should not be installed on interior stairways or toilet room doors. The needs for life safety, force protection, and access control should be coordinated in the selection of hardware. In locations where doors potentially can be used as a means of egress for assembly use groups, the design A-E should avoid inadvertently controlling doors in the direction of egress with delayed-release locking devices.

Glazing Types (Blast Resistant Tempered) - UFGS 08 56 53

Generally, windows should be manually operated. Glazed openings susceptible to accidental human impact should be designed in accordance with the applicable IBC, Consumer Product Safety Commission (CPSC), or similar code safety requirements in model building codes. In considering the use of high-performance glazing, the designer should carefully match the solar gain/heat loss values and thermal performance levels including solar gain. Force protection issues must also be considered in the glazing design at locations where exposure to threat is indicated. Such glazing units and restraint systems in insulated units are a significant cost issue. The needs for natural daylight, thermal efficiency, value, and security should be balanced. Security window sash and bars may be used only at ground floor locations of supply and repair parts rooms and warehouses.

DIVISION 09 FINISHES

Basic Interior Finishes

All facility-type design guides include tables for generic interior finishes appropriate for use within each room or space.

Acoustical Ceilings - UFGS 09 51 00

Resilient Flooring - UFGS 09 65 00

Carpet - UFGS 09 68 00

Exterior Painting and Coatings - UFGS 09 90 00

The painting of exterior galvanized metal surfaces (gutters, downspouts, and flashing) is authorized where such surfaces are exposed to view from the ground. All exterior aluminum doors, window frames, and trim may be anodized (clear or bronze). Wood windows, doors, and trim, as well as non-galvanized or unfinished steel windows and doors, may be painted. Baked-on colors are authorized instead of anodized finish on aluminum or steel commercial-grade doors and windows.

DIVISION 10 SPECIALTIES

Bulletin and Tack Boards - UFGS 10 10 00

A standard manufactured bulletin or tackboard with a cork surface laminated to a backing board and a clear anodized aluminum frame (flush mounted) is authorized. The board should be permanently affixed to the wall with vandal-proof fasteners.

Marker Boards - UFGS 10 10 00

A marker board with a standard color, appropriate finish, clear anodized aluminum tray, and frame (flush mounted) may be provided. The board should be permanently affixed to the wall with vandal-proof fasteners.

Exterior Signage (Free-standing or Building Mounted) - UFGS 10 14 01

Building identification signs are authorized for all projects. The sign may be free-standing building mounted or independent letters may be mounted directly on the exterior building surface. It should be located in direct view of the public, facing a main thoroughfare or public street. The facility name letters should be a maximum of 12 in. high, and the State name followed by "ARMY NATIONAL GUARD" should be a maximum of 8-in.-high letters.

Interior Signage - UFGS 10 14 02

Room signs may be made of aluminum or plastic material. Letters or numbers should be no larger than 1 in. in height. Preference should be given to pre-manufactured

systems that have interchangeable components. Signs may be made of aluminum, steel, plastic, or other appropriate materials of equivalent cost.

Toilet Partitions - UFGS 10 21 13

Toilet partitions should be of steel, with a baked enamel finish or plastic laminate, for durability. Partitions should be anchored to solid reinforcement in the walls, and should be supported overhead and secured to the floor (including miscellaneous metal bracing above the ceiling.)

Toilet Accessories - UFGS 10 28 13

Toilet partitions should be of steel, with a baked enamel finish or plastic laminate, for durability. Partitions should be anchored to solid reinforcement in the walls, and should be supported overhead and secured to the floor (including miscellaneous metal bracing above the ceiling.)

Metal Lockers - UFGS 10 51 13

Lockers should be raised on a base above the floor. A full-length wood bench, anchored to the floor, should be placed between each parallel group of lockers. In selecting hardware, the design A-E should coordinate the needs for access control. Lockers should be deep enough, tall enough (single tier), and wide enough for required equipment and clothing to be stored. Lockers are to be secured with padlocks furnished separately.

DIVISION 11 EQUIPMENT

Food Service Equipment Schedule

Refrigerated and Frozen Food Storage Equipment - UFGS 11 41 11

Food Preparation Equipment - UFGS 11 42 00

Food Cooking Equipment - UFGS 11 44 00

Food Dispensing Equipment - UFGS 11 46 00

Ice Machines - UFGS 11 47 00

Cleaning and Disposal Equipment - UFGS 11 48 00

Vaults (Armory)

The area of the vault can be obtained from the approved program documents. Generally, no vaults should be designed with less than 300 square feet of space. Vaults should be designed and constructed in accordance with AR 190-11. Conduit for

the intrusion detection, telephones, and electrical systems should be provided by the design A-E. If a modular vault constructed of precast panels meets or exceeds the security requirements in AR 190-11, it may be bid as an additive alternate to the constructed-in-place vault and the less expensive vault should be selected. A vault should not be placed on an exterior wall.

Vault Wall Construction

Vault walls shall, at a minimum, consist of 8-in.-thick reinforced concrete. The wall will be reinforced with No. 4 reinforcing bars at 9 inches on center in each direction in each face of the wall.. Reinforcement in the 2 faces of the wall will be staggered on each face to form a projected grid approximately 4-1/2 inches square. Reinforcement in the walls will be tied into floors and ceilings in accordance with American Concrete Institute standards. In addition, Anchor rings should be installed along the inside walls to facilitate the securing of arms racks. As an alternate, a 3/8-in.-thick by 2-in.-wide

hardened steel bar located continuously around the inside wall, with anchor rings welded to the bar, may be used to facilitate the securing of arms racks.

Vault Floor Construction

The vault floor should consist of a 6-in. reinforced concrete slab construction reinforced with 6 inches by 6 inches, W4 by W4 welded wire fabric or equivalent steel reinforcing bars (based on area of steel per square foot).. If the floor is the ceiling for a room or area below, the slab shall be a minimum of 8 in. thick. Where equivalent steel reinforcing bars are used, bar spacing will form a grid so that the area of any opening does not exceed 96 square inches.

Doors and door frames.

The vault door threshold must be level with the adjoining floor to allow easy movement of pallet jacks and other wheeled items. The door will be GSA approved Class V armory door per GSA Fed Spec AA-D-600D. Door frames will be per Fed Spec AA-D-600D.

Vault Ceiling

Ceilings and roofs will be of reinforced concrete construction. The thinnest portion may not be less than 6 inches. reinforcing bar spacing will form a grid so that the area of any opening does not exceed 96 square inches using No. 4 bars or larger. If the ceiling is the floor for a room above, the slab should be a minimum of 8 in. thick.

Vault HVAC

The vault should be provided with a (Z-type) vent for emergency ventilation. The design A-E should provide for a minimum of four air changes per hour of supply air from a central HVAC unit into the vault, and the air should exhaust directly to the outside.

The design A-E should also specify a packaged dehumidifier. The dehumidifier condensate floor drain should be located outside of the vault. Canvas-type flexible duct connections should be used to eliminate vibration, and ducts should terminate with security grilles and registers at the interior surfaces. Windows are not authorized. Ducts, vents, and other openings of 96 square inches or more with the least dimension greater than 6 inches will be secured in accordance with 1 of the following methods and otherwise limited to the minimum number and size that are essential

- (1) Sealed with material comparable to that forming the adjacent walls.
- (2) Fitted with any of the barriers below with bars or steel mesh securely embedded in the structure of the building or welded to a steel frame that will be securely attached to the wall with fastenings inaccessible from the exterior of arms storage facility.
 - (a) Three-eighth inch or larger hardened steel bars with vertical bars not more than 4 inches apart and with horizontal bars welded to the vertical bars so that the openings do not exceed 32 square inches.
 - (b) A minimum of 8-gauge high carbon manganese steel mesh with 2-inch diamond grid.
 - (c) A 6-gauge cold drawn steel wire mesh with 2-inch diamond grid when 8-gauge mesh above is not available.

Modular/Portable Arms Vault

Modular/portable arms vaults may be used for service in lieu of concrete constructed in place units where they can be located in a secure environment meeting AR 190-11 and DOD NSWC 3046-93-2 Standards. These pre-engineered vaults must meet all the above requirements of the constructed in place units.

Security Safe

A security safe that is permanently installed (mechanically secured to the floor or wall) may be provided within the vault to store weapon parts and other highly sensitive items.

Loading Docks - UFGS 11 31 10

In addition to the docks authorized for the data and parts vans and trailers, a loading dock should be provided in the receiving and shipping area of the Class IX operation. The dock should be of sufficient length to provide space for a minimum of three trucks simultaneously loading or off-loading supplies. The dock should be 15 ft deep to provide the required space for forklift operations, approximately 4 ft high, and covered with a roof. Each of the truck docking spaces should be equipped with a mechanical self-leveling dock leveler. One of the truck loading and off-loading dock spaces should have an enclosure equipped with an air seal to close the gap between the enclosure

and truck body. If operational requirements make it necessary (that is, if the outside heating design temperature is 15°F or cooler), a heated air curtain should be provided at one or two doors (but not at the door with the enclosure). Rubber, neoprene, or wood dock bumper blocks should be included. Stairs to the dock(s) should be provided as required. The dock(s) should have an access ramp no wider than 10 ft to provide forklift access to the dock. The lighting illumination level on the dock should be 30 FC.

DIVISION 12 FURNISHINGS

Window Blinds - UFGS 12 21 00

Operable blinds or shades may be provided in administrative and shop areas except workbays. Blackout shades and blinds should be installed in any functional areas where training or briefings may occur, including the break and assembly or safety briefing areas.

Furniture Systems (Workstations) - UFGS 12 50 00

This specification establishes the minimum requirements for the acquisition and installation of a complete and usable system of modular workstations, freestanding work surfaces, electrical wiring and communication access requirements. A comprehensive interior design with furniture/equipment layout drawings and cost estimate construction documents must be provided. For complete interior design guidance reference UFC 3-120-10. Design funds for Military Construction Program Planning and Design must be used for all interior design construction documents preparation.

Interior Design and Administration

GENERAL INFORMATION

Interior Design is required on new building construction and renovation projects regardless of funding source or type of project. Planning furniture cannot occur too early for a project. Furniture, fixtures, and equipment should be identified in the programming phase by the designer. Currently the furniture plan is afterthought and is not included in the construction documents.

PURPOSE

A Comprehensive Interior Design (CID) will provide, unless otherwise directed, and includes the Structural Interior Design (SID) and the Furniture, Fixtures, and Equipment (FF & E) Design. The CID provides a formal method for establishing the standard and requirements for all furniture, fixtures, equipment & sometime millwork. The Structural Interior Design includes building related design elements and components generally part of the building itself, such as walls, ceilings, floor coverings, and built in casework. The Furniture, Fixtures, and Equipment is the selection, layout, specification and documentation of workstations, seating, storage, filing, visual display items,

accessories, window treatments, and artwork including contract documentation to facilitate pricing, procurement, and installation. The designer shall refer to UFC 3-120-10 Interior Design and UFC 4-610-10 Administration Facilities for additional information and requirements.

PROFESSIONAL

The primary benefit to employing the Interior Designer directly is having an independent and objective advocate whose only focus is the function and aesthetics of the interior space. The main benefit of having an Interior Designer under contract to the Architect is enhanced communication and closer project coordination. In either case, the Interior Designer will have direct communication and coordination with both parties.

The Interior Designer's scope of services may include space planning; development of the furniture program and budget; design of custom millwork & furniture; selections of interior finish material and design motif; interior signage design and specification and specification of furniture and shelving. It should include several meetings to discuss functions of the interior spaces and furniture requirements. The layouts, selections of specific items, and presentation boards of colors and finish materials should be presented to the client as the phases are completed.

PROCUREMENT

Refer to UFC 3-120-10 Interior Design for procurement methods for the CID.

TIMELINE

During the programming phase, FF& E should be included. With early input, the space planner can accommodate the required furniture. It can also assure that a realistic budget is developed. Begin with a list all furniture items to be place in the facilities, included preferred dimensions, quantity, equipment to be housed and any electrical and data requirements. Existing furniture reused should be listed as refurbish. Below is an example of a spreadsheet that would assist in the preliminary furniture list may be used.

ITEM	ITEM NAME	#	LOCATION	EX/NEW	DESCRIPTION	FINISH	NOTES
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During the design phase, selection of furniture and budget should be done. Specification and drawings should be included in the construction document phase. The electrical and data coordination are also required early in the project.

PERFORMANCE STANDARD

There are many points to consider when selecting furniture, functionality and durability are the primary. Performance standards should be reviewed prior to making any furniture decision. The Business and Institutional Furniture Manufacturer's Association (BIFMA) provides a listing of available standards. It currently lists the American

National Standard for Office Furnishings (ANSI) standards for the following products: General Purpose Office Chairs, Lateral Files, Vertical Files, Desk Products, Panel Systems, and the BIFMA Ergonomics Guideline for VDT (Visual Display Terminal) Furniture.

BUDGET

Cost Engineering (CE) will be an integral part of the design process. Apply the CE principles and practices in the pre-design and programming development stage relative to establishing costs. Initiate more CE cost relative to the scope and requirements at the concept design on program documents and use throughout the design and construction of projects. Based design decisions on life-cycle cost considerations to determine an economical design for facilities. Take into account not only the initial construction costs but also the operating and maintenance costs of buildings, the associated impacts on productivity and missions performed within the facility over their anticipated life. Designers must design within current cost criteria and requirements of each project's programming documents and Form DD 1391. Once the furniture itemized list and FF& E plan have been prepared, a preliminary budget can be estimated. It is important to use realistic costs rather than general cost per square foot. Allowances should include freight, delivery, installation relocation and sales tax. Contingency amount is for unforeseen items and unanticipated price increase. Allowances and contingency should be included in the budget. The budget should be updated often as the CID is updated. Life-Cycle Costing is a sometime factor in the budget and specifying furniture. It includes elements other than acquisition cost to determine the actual cost over time. The initial cost includes discounts, shipping, delivery, handling assembly, storage, installation, personnel, training, etc. Other elements to consider about the initial cost are service life of product; recurring operational costs and maintenance cost. Life Cycle Costing adds another dimension to the budgeting process and provides additional quality control by analyzing the cost of the product over its lifespan, with the added potential for operational and maintenance cost savings.

CRITERIA

Besides the functionality and cost, appropriateness to the over-all design concept is one of the first criteria used in selecting furniture finish materials. Careful attention should be paid to matching materials and stain colors and sample submittals for all products should be examined and compared. Durability and longevity is another important criterion in selecting materials. If a material won't stand up to heavy use and wear or can't be easily repaired, then it probably shouldn't be used. To minimize static electricity generation in sensitive computer areas, wood or other nonconductive materials should be used rather than plastic coated or metal furniture. Vinyl upholstery can also contribute to the problem. Wool or wool nylon blends would be a better choice. Ergonomics should be taken into consideration. It is designed to adjust to the user's body such as the mechanisms ranging from simple seat height to multitude of adjustments.

MAINTENANCE ISSUES

All furniture materials must be maintained. Maintenance instructions should be requested from each manufacturer and kept together for reference. Often the life of a material is determined by the care it receives. Correct cleaning procedures will help preserve the furniture. Follow cleaning instruction and maintenance instruction per the manufacturer.

DIVISION 13 SPECIAL CONSTRUCTION

A. Intrusion Detection System (IDS) General Information

The Electronic Security Program Office (ARNG-ILI-F) has selected three (3) IDS for protection of Federal assets and arms, ammunitions, and explosives (Ademco Vista 128 Panel; FBI XL4 Panel; IST/EUROPLEX 2064NG Panel). IDS shall be installed in each facility containing an arms and/or ammunition vault. The system shall consist of a Commercial IDS furnished by the Federal government and installed by the contractor or State. The IDS shall include the following:

Vault Pre-Entry Area

The space providing access to a vault should have the following:

- One ultrasonic motion sensor directed at the vault door
- An ultrasonic motion processor
- Balanced magnetic switches on all doors and operable windows
- A time delay device with timer and duress capability

Arms Vault Protection/Commercial IDS

The arms vaults should have the following controls and related equipment:

- A balanced magnetic switch on the door
- Passive ultrasonic sensors throughout (vibration sensors where ultrasonic noise levels prevent the use of passive ultrasonic sensors)
- A passive ultrasonic processor
- A data transmission system located in the control unit connected to a dedicated telephone line for monitoring

B Pre-Engineered Structures - UFGS 13 34 19

Pre-engineered structures may be used for the following if they meet functional requirements:

- Controlled waste-handling facility
- Covered (enclosed), unheated vehicle and parts storage
- Covered storage areas

If required, shelving and access metal ramps affixed to the structure may be purchased as part of the unit. These structures are to be attached to a concrete slab, and the electrical power line is to be hardwired to the electrical control panel of the structure. The same electrical and mechanical service requirements need to be met as in conventional construction.

C Sensitive Compartmented Information Facility (SCIF).

Ref: UNIFIED FACILITIES CRITERIA (UFC) 4-021-02NF. Security Engineering: Design of Electronic Security Systems (ESS). ESS is the integrated electronic system that encompasses the Access Control Systems (ACS), interior and exterior Intrusion Detection System (IDS), Closed Circuit Television Systems (CCTV systems) for assessment of alarm conditions, the Data Transmission Media (DTM), alarm reporting systems for monitor, control, and display, and the policies, procedures, and response times that ensure that all elements of the ESS work effectively.

SCIF can be an enclosed area within a building (a room), a trailer enclosed in special panels to prevent information from leaking and where jamming is used to prevent surveillance or a facility capable of storing Sensitive Compartmented Information (SCI) materials. Requirements for these facilities are defined in Intelligence Community Directive (ICD) 705 or latest and Intelligence Community Standard (ICS) 705.1 – Guidance on SCIF Construction.

Design Considerations and Guidance

1. Introduction

- All new and renovated SCIFs in the ARNG must be designed to the requirements of UFC 4-021-02NF and 705.1 – Guidance on SCIF Construction.. The design will be sent to ARNG-ILI before construction for review and approval..

2 Entries and Exits

SCIFs are limited to only one entrance unless approved by the Cognizant Security Authority. Use of external door hardware is prohibited on SCIFs (with the exception of the SCIF entrance)..
Per DoD Directive 8190.3, the CAC should be “the principal card enabling

- physical access to SCIFs. Other supplementary security systems (such as badging systems) that are considered necessary to provide an additional level of security not presently afforded by the CAC may be used.
3. **INTRUSION DETECTION SYSTEM (IDS).** Reference: Chapter 5 of UFC 4-021-02NF. The principal elements of an IDS include interior sensors, exterior sensors, Central Processing Unit (CPU) or local controllers, communications and interfaces with ACS, CCTV and the Dispatch Center. Do not use dual-tech devices in SCIFs. Dual-technology sensors can only be used in a SCIF, vault, or secure room if the technologies operate in an “OR” configuration (either the microwave or PIR sense an intruder). Therefore dual technology sensors are not recommended for this application.
 4. **PCU -** SCIFs must have a PCU installed Per the DCID 6/9 definition a PCU is a (CPU). See Figure 3 on Page 132, at the end of this document. A PCU receives signals from all associated sensors in the SCIF’s alarmed zone and establishes the alarm status. The alarm status is immediately transmitted to the monitoring station within the monitoring station, a dedicated alarm-monitoring panel (or central processor) monitors incoming PCU signals. On receiving an alarm signal, a monitoring station’s enunciator generates an audible or visual alarm for the monitoring personnel
 5. **CCTV Installation** CCTV cameras should not be installed in areas that may compromise classified material (such as SCIFs).
 6. The computer running within this facility must operate under rules set forth in ICD 503. Computer and telecommunication equipment within must fall within the TEMPEST emanations specification as directed by a Certified TEMPEST Technical Authority (CTTA).
 7. **Backup Power Battery Backup -** The minimum requirement for battery backup for an IDS and its monitoring station is eight hours. If primary power is subject to being out for longer periods, increase backup capacity accordingly. The requirement for battery backup for a SCIF and its monitoring station is 24 hours. The battery backup requirement for a SCIF can be reduced if the system is on a generator. Monitoring stations must have visible and audible indicators to inform system operators of failure of a power source, a change in power source, and the location of the failure or change. Any metallic conduit that leaves an area that processes classified information such as a SCIF must be decoupled (insert of nonmetallic conduit) when existing the area.

SECTION 5 MECHANICAL AND PLUMBING SYSTEMS DESIGN

DIVISION 14 CONVEYING SYSTEMS

Hydraulic Elevators - UFGS-14 24 00

The majority of ARNG facilities are not more than three stories in height; therefore, hydraulic elevators should be used in compliance with TI 810-90

DIVISION 21: FIRE SUPPRESSION

Fire Protection Systems - UFGS 21 13 00

An automatic sprinkler system with a fire alarm signaling system should be designed and installed. The system shall meet the requirements of the IBC, UFC 3-600-01 Fire Protection Engineering for Facilities and NFPA 13 and NFPA 72 of the National Fire Codes. Buildings must be of noncombustible construction meeting IBC or Uniform Building Code (UBC) Type I and II. Regardless of the construction type, any facility meeting any of the following criteria should be provided with an appropriate fire protection system:

- The area exceeds 15,000 ft².
- Operational impairment would reduce the operational readiness and responsiveness of the strategic or tactical defensive and offensive capability.
- The contents include direct war-fighting assets (combat aircraft or tactical vehicles).
- The facility and contents housing critical equipment requiring a long lead time to replace that have a high monetary value with a replacement cost or value exceeding \$5.0 million.

Fire Protection System (AFFF) - UFGS 21 13 24

Aqueous Film-Forming Foam should be used for Army Aviation Support Facilities helicopter maintenance hangars.

Wet Pipe Sprinkler System - UFGS 21 13 13.00

Dry Pipe Sprinkler System - UFGS 21 13 17.00

Foam Fire Extinguishing for Aviation Facility - UFGS 21 13 20.00

Foam Fire Extinguishing for Haz/Flam Materials - UFGS 21 13 22.00

DIVISION 22 PLUMBING SYSTEMS

System Sizing

Plumbing systems should be designed and installed in accordance with the International Plumbing Code, American Society of Plumbing Engineers (ASPE) Data Book and the State/Local Plumbing Codes.

Piping Insulation - UFGS 22 07 19

Heating, cooling, and plumbing piping should be insulated in accordance with ASHRAE Standard 90.1-2007 or the State Energy Code. Waste and drainage piping should be

insulated with a sealed vapor barrier where condensation may occur. Insulation type should be as indicated in related ASTM standards. Insulation application should be in accordance with MICA Standards.

Piping Systems Support - UFGS 22 05-48

The materials for piping supports should be in accordance with Manufacturers Standardization Society (MSS) SP-58, SP-69, and SP-89. The design A-E should provide a pipe flow diagram showing all sizes, flow rates, valves, coils, vessels, and pumps. Typical piping details for coils, vessels, and pumps should be part of the contract drawings to support the test and balance contractor and maintenance staff.

Pipe Labeling

Piping systems should be labeled for identification purposes. Where painting is authorized, the pipe exposed to view may be painted to match adjacent surfaces. Piping should be labeled to indicate the fluid and direction of flow.

Piping Specialties - UFGS 22 00 00

The following should be provided:

- Thermometers at the inlet and outlet of hot water boilers, heat exchangers, and major AHU coils
- Thermometers at the outlet of domestic water heaters
- Pressure gauges at the inlet and outlet of HVAC pumps and at hydronic system water makeup points
- Strainers at the inlet of pumps

Domestic Water Piping - UFGS 22 00 00

Domestic water piping should be insulated Type M copper for hot and cold service, with heat-free solder.

Sanitary Waste and Vent Piping - UFGS 22 00 00

Sanitary waste lines for above-grade and venting service should be cast iron soil pipe Schedule 40 PVC or copper alloy drain, waste, or vent (DWV) tubing. All below-grade sanitary waste lines under the building should be cast iron soil pipe.

Storm Drainage Piping - UFGS 22 00 00

Storm drain pipes shall be Schedule 40 PVC for conductors and cast iron soil pipe for below-grade service. Interior roof drains discharging onto grade are authorized for large roof areas but must be coordinated with the civil storm drains and regulations. Interior roof drains discharging into underground piping systems are authorized in areas where the heating design temperature, as determined from the 97.5 percent column in UFC-3-400-02, is (+) 10°F dry bulb or less. Federal support is also authorized for the underground piping system in these areas. The design A-E should provide roof relief scuppers in accordance with the plumbing code where parapets surround the drainage area.

Fuel Piping - UFGS 22 00 00

Gas and fuel oil piping should be Schedule 40 black steel or Type L copper tubing. (Steel fuel oil piping should have welded joints.) Fuel-dispensing output capacity should not exceed 26 gpm. Special approval is needed for high-speed, large-capacity units involving multiple dispensing systems and a pump located in the tank.

Plumbing Fixtures - UFGS 22 00 00

Water closets should have self-closing valves, flushometers, and low-flow-type fittings for water conservation. The number provided should be based on the International Plumbing Code (IPC) or the State plumbing code, whichever is most stringent. Floor-mounted or wall-hung tank-type fixtures of vitreous china shall be specified where water pressure is a factor. Flush valve fixtures may be used where the required water pressure is available.

Lavatories - UFGS 22 00 00

Countertop lavatories should be provided in female toilet rooms, and either countertop or wall-hung units should be provided in male toilet rooms.

Showers - UFGS 22 00 00

The amount of showers should meet the requirements of the IPC, the State code, or NG PAM 415-12, whichever is more stringent.

Mop Sink - UFGS 22 00 00

Each occupied building should have a minimum of one janitorial closet with a mop sink per floor.

Water Coolers UFGS 22 00 00

Water cooler drinking fountains are authorized in barracks, educational facilities, medical clinics, dining facilities, training site headquarters, all unit headquarters buildings, and any other location where required by an applicable code. They should not be recessed unless they would cause a safety hazard or unless recessing is required to meet Federal, State, and/or local codes.

Eye Wash and Deluge Shower - UFGS 22 00 00

An eye wash and deluge shower, equipped with an audible alarm that is activated when they are operated, should be installed in any area where personnel could be accidentally exposed to harmful wastes in accordance with ANSI Standard Z358.1-2004. The alarm should be located where workers outside of the immediate area can hear it and respond. The location of the eye wash and deluge shower should allow easy access from any point in the facility (10 second walk). Floor drains are not recommended. Tempered water is required to be between 70-95 degrees F.

Exterior Wall Hydrants - UFGS 22 00 00

Freezeless anti-siphon wall hydrants should be provided no closer than 100 ft apart on the exterior walls of a building.

Hot Water Heaters - UFGS 22 00 00

Separate point-of-use water heaters, instead of circulating pumps and piping, may be provided for remotely located toilet areas.

DIVISION 23 HEATING, VENTILATING, AIR CONDITIONING

General Information

Mechanical systems should be designed in accordance with the latest recommendations of ASHRAE Handbooks and Standards and the ACGIH Industrial Ventilation Manual. Ductwork for heating, cooling, and exhaust should generally be overhead instead of underground, and should be minimized to the shortest runs possible. All ductwork should be of sheet metal, and designed and constructed in accordance with handbooks and standards by ASHRAE and the Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).

HVAC System Sizing

The system components should be selected to maintain an inside winter design temperature of 68 °F during the heating season except in storage rooms, maintenance training work bays, and the weapons vault, where the design temperature should be 55 °F. Summer inside Design Temperatures should be 78 degrees F and 50% RH maximum and 30% RH minimum. To the greatest extent possible, the areas designated

for part-time occupancy should be on separate zones from those having full-time occupancy. Exterior design conditions must be in accordance with UFC-3-400-02, Engineer Weather Data and ASHRAE Handbook of Fundamentals.

Seismic Bracing - UFGS 23 05 48

In all regions where the building design must comply with seismic force resistance, the design A-E should provide bracing and anchoring of interior and exterior mechanical piping and equipment for protection from damage. Bracing and anchoring should be designed and installed in accordance with UFC 3-310-03A, Seismic Design for Buildings and ASHRAE Application Handbook.

Ductwork Insulation - UFGS 23 07 00

All heating and cooling system supply and return air ductwork should be externally insulated following the latest recommendations of the Midwest Insulation Contractors Association (MICA) National Commercial & Industrial Insulation Standards and ASHRAE Standard 90.1-2007. Internal insulation should be used only on exhaust ducts. Return and exhaust ducts do not require insulation within conditioned areas. Direct lining should not be used in supply ducts.

Heating Systems - UFGS 23 54 19

An LCCA must be performed. It should address the initial construction cost and annual operating and maintenance cost, calculated in discounted dollars, for each proposed system. The analysis should clearly indicate which system has been selected, and if it is not the lowest-cost option, a justification should be presented.

Heat Pumps Water/Ground Source - UFGS 23 81 47

Water source heat pumps may be used if justified by the LCCA. Heat pumps provide efficient operation, especially where electric resistance heating is the only other viable option. Heat pumps permit zoned temperature control and allow temperature to be set back on a room-by-room basis when spaces are unoccupied.

Infrared Radiant Heaters - UFGS 23 54 16

Infrared radiant heaters using oil or natural gas for fuel may be used for vehicle workbays and for shipping and receiving areas of warehouses.

.....Energy Sources

The selection of the energy source for the heating system is part of the LCCA process which establishes the most cost-effective alternative available in accordance with the provisions of AR 420-49. The viable alternatives include:

- Fuel oil
- Natural gas
- LPG
- Electricity
- Solar
- Geothermal

If fuel oil is the primary source, an above-ground storage tank or an underground storage tank (with double-wall containment and monitoring wells) may be installed. If natural gas is the primary fuel, the boiler may be equipped with dual fuel burners and an interior pipe line to the exterior building wall (but not a storage tank) to facilitate possible future conversion to the use of fuel oil as the energy source availability and economics dictate.

Pollution Control - UFGS 23 51 43

Heating systems are subject to Federal, State, and local air pollution control regulations. Generally, heating systems are regulated based on the fuel source and design heat input in British thermal units (Btu) per hour. If the heat input exceeds a regulated limit, an air permit may be required for construction.

Boilers Heating Systems - UFGS 23 52 00

If a boiler is chosen as the most economical system, a hot water unit is more economical to operate than a steam unit. Boilers may use coal, natural gas, or oil, to be determined based on the appropriate fuel selection procedures. Two heating boilers may be selected, provided that the output capacity of each boiler would not exceed two-thirds of the design heating load. Hot water heating systems generally are economical in cold weather climates and should not be considered for warmer climates unless an LCCA proves them to be the most cost effective. Chemical treatment of water should be used where analysis indicates it is necessary.

Mechanical/Industrial Ventilation Systems - UFGS 23 35 19

Mechanical ventilation systems for summer operation of non-air-conditioned areas should provide a minimum of four air changes per hour. The minimum air changes per hour for interior heat control should be based on the internal heat gain. The minimum air change per hour for dilution ventilation and exhaust should be as recommended by the ASHRAE handbooks, the ACGIH Industrial Ventilation Manual, and OSHA Standards for General Industry. Special exhaust systems are required as identified in

each facility-type design guide. Mechanical ventilation should be provided in all climates during the summer and winter seasons.

Air Conditioning Systems and Evaporative Cooling

Mechanical air conditioning or evaporative cooling for personnel comfort shall be in accordance with AR 420-49, Chapter 7, Air Conditioning and Refrigeration. Spaces to be air conditioned should be consolidated to the maximum extent feasible and efficiently zoned within the system design. Central station air handling or packaged units with 35% efficiency filter banks should be used to the maximum extent possible. Independent units of the appropriate size should serve small, remotely located spaces. HVAC equipment should be located in indoor mechanical equipment rooms wherever possible to facilitate maintenance and extend equipment life.

System Sizing HVAC

The system components should be sized to maintain a summer indoor design temperature of 78 °F with a maximum RH of 50 percent and a winter indoor design temperature of 68 °F and 35% RH based on an outside design temperature as designated in ASHRAE Fundamental Handbook and UFC-3-400-02 Design Engineering Weather Data for the project location.

Desiccant Dehumidification Equipment - UFGS 23 84 16

Energy Recovery Systems - UFGS 23 72 00

Filters-HVAC Systems - UFGS 23 41 13

System Controls - Direct Digital - UFGS 23 09 23

A system of direct digital controls should be used to maintain the interior temperature at the design level during periods of occupancy and at lower temperatures (40 to 50 °F) as appropriate when unoccupied. Pneumatically operated systems may be used as an extension of an existing system.

DIVISION 25 INTEGRATED AUTOMATION

Energy Management & Control System - UFGS 2510 10

Utility monitoring and control systems should be used to conserve energy by providing a capability to preset the appropriate temperature levels for unoccupied periods. An outdoor temperature-sensing control located near the mechanical room should be provided to automatically shut off the heating system when the outdoor temperature reaches or exceeds 65 °F for more than 24 hours. The outdoor temperature-sensing control should have a convenient manual override.

SECTION 6 ELECTRICAL AND COMMUNICATION SYSTEMS DESIGN

The electrical and communication systems design should consist of safe and economical power distribution, lighting, communication, and fire alarm and signaling systems meeting present requirements and anticipated future growth. The design should meet requirements of NFPA, applicable codes, and Unified Facilities Criteria.

DIVISION 26 ELECTRICAL

General Information

Exterior Electrical Design

Direct burial cable marked with above-ground indicators at appropriate intervals should be used to the maximum practical extent. Conduit should be limited to those sections passing under paved areas unless the local electric company policy is to install all underground service in conduit. Lighting and power loads should be served at the highest voltage practicable. The design A-E should specify primary power at three-phase, 480Y/277 volts and use a dry-type transformer to obtain 208Y/120 volts where required.

Service Line

The secondary power supply line should be sized adequately to accommodate any future projected demand. The electrical power to such items as fuel-dispensing systems and lubrication and inspection racks is included under this item. Extension of the primary power supply line, substations, and transformers should be the financial responsibility of the locality or State, except when a proposed building is located on Federal property. **Generators must be provided for Readiness Centers, Aviation Support Facilities, USPFO/Warehouse, Barracks and Dining Facilities.** The designer must provide the necessary auxiliary equipment.

- A quick power disconnect
- An automatic transfer switch (manual w/o generator provided)
- Fuel oil and diesel piping from the storage tank
- An 8-ft by 16-ft by 6-in. reinforced concrete pad near the main power service

Interior Electrical Design

The design for the electrical systems should include provisions for safe and economical electrical distribution, lighting, communications, and signaling systems that meet present requirements and anticipated future growth. The electrical power distribution system should be designed to meet all requirements of UFC 3-520-01 and NFPA 70.

Seismic Bracing

The design A-E should provide bracing and anchoring of electrical conduit, cable trays, and equipment to protect them from damage due to seismic forces where the regional requirements dictate. Refer to UFC 3-310-03A, Seismic Design for Buildings and the International Building Code for guidelines regarding seismic bracing requirements.

Wiring – UFGS 26 05 19

Wiring (including conduit for future communications), junction boxes, and plug-in receptacles may be selected for use in a grid arrangement above the suspended ceilings in large open administrative areas. This is to be used in conjunction with "telephone power pole" systems or conventional wall and/or floor pedestal outlets. Wiring and conduit may be labeled or tagged for circuit identification but should not be painted. Electrical metallic tubing or rigid conduit should be used where required by code. The administrative areas, corridors, lobby, toilets, classrooms and library, learning center, food preparation and scullery area, and physical fitness area should have concealed conduit, which may also be used throughout the facility.

To reduce overheating of the neutral conductor due to harmonic currents caused by switch mode power supplies in computer equipment, the neutral of multi-wire branch circuits should be sized at 175 percent of the phase conductors. The oversized neutral will occur at multi-wire branch circuits, which may have computer equipment connected. Using the oversized neutral has two benefits over separate circuits: 1) reduced cost because of decreased wire and conduit quantities; 2) reduced voltage drop because a three-phase voltage drop is less than a single-phase voltage drop and the oversized neutral has less voltage than the code minimum neutral.

Electrical Receptacles

Electrical receptacles should be provided in accordance with tables included in the appendices of each facility-type design guide. Emergency power receptacles shall be red in color.

Electrical Power

The interior electrical system should be designed for the most efficient and economical distribution of power, using the highest voltage consistent with the load served. A three-phase, 208Y/120-volt system should generally be the minimum, with consideration given to the use of a 480Y/277-volt system where loads are sufficient to justify it.

Primary Electrical Service

Primary electric service shall be provided underground from the nearest pole to pad-mounted, three-phase transformers located near the exterior of the mechanical equipment room or load center.

Secondary Electrical Service

Secondary electric service from transformers to the building shall also be underground. If metering is required, the electric meter should be placed on the secondary service side rather than the primary service side. Digital Meters should be provided to each building.

Emergency Generators/Automatic Transfer Switch - UFGS 26 32 15/26 28 21

Generators should be placed away from areas averse to noise and fumes, to include fresh air intake louvers. Reference NFPA 110, Standard for Emergency and Standby Power Systems. An Emergency Power Generator and Automatic Transfer Switch must be provided for every Readiness Center, Army Aviation Support Facility, Barracks, Dining Facility and USPFO/Warehouse.

Ground Fault Protection

Ground fault provisions should be in accordance with NFPA 70. Ground fault protection may be used for all receptacles where power tools will be used.

Service Distribution

Service and distribution equipment exceeding 600 volts should be metal enclosed and manually operated, with fusible load-interrupter switches or power circuit breakers. Low-voltage services should have power circuit breakers or fusible disconnect switches.

Interior Distribution - UFGS 26 20 00

The electrical system design should include the most efficient and economical distribution of power, using the highest voltage consistent with the loads served. A three-phase, 208Y/120-volt system is generally the minimum, with consideration given to the use of a 480Y/277-volt system where loads are sufficient to justify it.

Lightning and Surge Protection UFGS 26 41 00 n

The design A-E should specify a lightning protection system for any building located in an area with a high lightning probability using the risk assessment calculation specified in *NFPA 780, Standard for the Installation of Lightning Protection Systems, Appendix H*. Power line surge protection equipment should be specified at the main service panel, mid-building panel, and any dedicated electronic or computer equipment service panel.

Power Panels - UFGS 26 24 16

Power panels, telecommunications equipment, and electrical equipment should be located in secure areas free from environmental extremes of temperature, dust, and humidity. Power panels may not be placed in storage rooms or janitor closets.

Interior Lighting Systems - UFGS 26 51 00

The lighting system design objectives are to economically provide lighting levels for efficient working conditions and effective nighttime vision for security and safety. The lighting system should be designed according to the Illuminating Engineering Society of North America (IESNA) Lighting Handbook and NFPA 70 National Electric Code.

Interior Fixture Types - UFGS 26 51 00

Except in high bay maintenance and classified areas, standard energy-efficient fluorescent light fixtures should be used. Fluorescent lighting may be used in high bay maintenance areas to supplement the metal halide lamps. Parabolic louver fixtures or indirect lighting should be provided in room areas with computer or monitor screens. The design A-E should take the maintenance and inventory cost of lamps and ballasts into consideration when selecting fixture types. T-8 fluorescent lamps and high-efficiency electronic ballasts should be used to achieve a 0.85 Watts/SF lighting power density.

Interior Lighting Intensity Level - UFGS 26 51 00

Lighting levels should conform to the foot-candle levels established for the individual functional areas as specified in the facility-type design guides. If required, portable lighting equipment purchased through standard supply channels should provide special supplementary localized lighting of higher intensity. All interior lighting should be designed in accordance with ANSI/ASHRAE/IESNA Standard 90.1-2007.

Exterior Lighting Systems - UFGS 26 56 00

Lighting should be provided on site at the following locations:

- At entrances to the site and building(s)
- Along sidewalks from parking areas to building entrances
- At military vehicle and POV parking
- Around the entire building perimeter
- At other areas as required for safety and security

- At flag poles

Lighting fixture types should be selected and placed to minimize intensity off site. The lighting for military vehicle parking should illuminate 30 to 40 ft of the area outside the fenced area where M-1 tanks are stored, if that area is within the facility property line.

Exterior Fixture Types - U FGS 26 56 00

High-pressure sodium vapor or metal halide vandal-resistant lenses should be specified. When motion detectors are used in conjunction with security lighting, lights should have the capability to activate instantly. After movement within the area discontinues, the lights should remain on for 15 minutes.

Exterior Lighting Intensity Level - UFGS 26 56 00

A minimum illumination intensity of 0.50 FC should be provided over the entire site. Existing street lighting should be taken into account in the design computations. The design A-E should make sure that the entire exterior of the facility is adequately illuminated for safety and security without undue glare falling on neighboring properties or landing aircraft. Lighting of fuel-dispensing facilities is authorized at an intensity of 20 FC at 3 to 4 ft above finished grade.

Explosion-Proof Fixtures

Lighting fixtures and electrical service located in classified areas (Class I, Division 1 and 2) should be designed and constructed to meet the requirements of the National Electrical Code (NEC), Article 500.

Emergency Egress Lighting - UFGS 26 52 00.00 40

Dual-purpose fluorescent fixtures with internal battery backup at appropriate locations including corridors, hallways, stairs, and fire exit egress should be considered as an alternative to dedicated emergency battery units (EBUs). Such fixtures generally would be the most economical alternative and would not require any special circuitry. Dual-purpose fixtures incorporate battery backup units and continue to function during power outages. If only EBUs are used, they shall be hardwired rather than the plug-in type.

Exit Signs - UFGS 26 53 00

Either illuminated or non-illuminated exit signs should be provided in accordance with applicable codes. Exit signs shall be the light-emitting diode (LED) type.

Lighting for Infrared Scanning

Designated lighting should be equipped with a sensor that illuminates the fixture(s) when the infrared scanning device detects motion. The lighting system may be equipped with an override switch that activates all perimeter lights on demand.

DIVISION 27 COMMUNICATIONS

Communication Systems

Conduit and cable should be provided for all components determined by the State DOIM.

Telecommunications and Cable Requirements

At the programming stage of the project, the CFMO should coordinate with the State Director of Information Management (DOIM) to determine the entire telephone and data communications system to be installed. Telecommunications cabling includes voice, video, and data in a single integrated plant. The cabling should be installed in accordance with *Interim Guidance from U S Army Information Systems Engineering Command, Technical Guide for Installation Information Infrastructure Architecture Technical Guide for 13A, UFC 3-580-01 Telecommunications Building Cabling Systems Planning and Design*; and the Telecommunications Industry Association (TIA)/Electronic Industries Alliance (EIA) 568A and 569-A Standard. Service at the facility should consist of a buried cable with sufficient pairs of wires to accommodate present and future requirements. In the construction drawings and specifications, the design A-E should specify the following as “contractor furnished and installed”:

- The system's outside trenching, plastic conduit, and cable to the terminal board, which is located in or near the mechanical or electrical room
- The cable trays
- Outlet boxes
- Wiring, including associated fittings, connectors, terminal strips, and similar devices needed to install the cable
- The cabinet mounting board

Fiber Optic Cable - UFGS 27 21 10

The DOIM should consider a fiber optic outside cable even though the telephone company's primary cable is not a fiber optic cable. The fiber optic cable would still allow for connection to a conventional telephone system inside the building.

Telephone Outlets

A maximum of one CAT- 6 telephone outlet should be provided at each of the following locations:

- Independent offices
- Approximately 70 ft² of open administrative area
- Each supply and repair area
- Outside the vault door to facilitate Commercial IDS testing
- Technical library, Classrooms and Training Areas
- Lobby (public telephone)

Power for Microprocessors

As long as an adequate number of electrical outlets are provided in areas where microprocessors are to be used, and the circuitry is properly designed to accommodate the anticipated loading, there should be no need for special dedicated circuit wiring for computer use. An exception is the Read Clear All Scalars (RCAS) server and printer location.

Antenna Base and Lead-In

Where one or more of the functional areas at the facility are authorized, a ground-mounted antenna system (either through the terrestrial directional antenna or other sources) with a concrete base and a conduit (with pull wire) leading into the building should be provided. If an antenna mast is roof mounted, a roof-mounted base, mounting brackets, guy cable tie-down, and conduit may be provided as part of the construction. Detailed coordination between the design A-E, the Military Department, and the user are necessary to identify the exact requirements.

Public Address System - FGS 27 51 16

Conduit, wiring, and equipment may be installed for the public address system as part of program requirements. This system should be audible throughout the buildings of the complex and at a reasonable distance outside in order to contact personnel whose exact location is not known. Generally, the unstaffed outbuildings do not require this system; if they do, NGB-ARI requires an approved justification.

DIVISION 28 ELECTRONIC SAFETY AND SECURITY

Carbon Monoxide Detectors - UFGS 28 31 49

Carbon monoxide detectors must be placed in all vehicle and aircraft maintenance Work Bays to create an alarm condition to activate second stage exhaust/ventilation system.

Fire Alarm/Detection and Mass Notification System -UFGS 28 31 76

An automatic fire alarm and detection system must be designed and installed in accordance with NFPA-72 and UFC 3-600-01, with a connection to the supporting fire-fighting unit. However, combined smoke and heat detectors (UL approved, with both smoke- and heat-detecting capability) should be installed in all billeting areas, including corridors. The smoke-detecting component should sound a local alarm confined to the fire-affected room(s), while the heat-detecting component should be connected to the building alarm system. Detectors should be spaced at not more than 30 ft on center and 15 ft maximum between a door and a detector. A Mass Notification System is required in any inhabited facility in conjunction to the Fire Alarm and Detection System. The system must be UL listed and Factory Mutual approved for the intended use.

SECTION 7 UTILITIES FUEL STORAGE

DIVISION 33 UTILITIES

Above-Ground Storage Tanks - UFGS 33 56 10

Above-ground storage tanks may be either single-walled steel or doubled-walled fiberglass-reinforced plastic. The tanks should be designed and installed in accordance with the American Petroleum Institute standards and NFPA 30, Section 2. If it is possible for the liquid contents to flow onto adjacent property or into a public waterway, tanks exceeding 500 gallons in size should be surrounded by a liquid-tight dike equipped with a drain sump, drain pipe, locked-type gate valve, and minimum of two tank grounds. All vegetation should be cleared from within the dike area. The dike area may be made liquid tight by lining the dike with neoprene, rubber, clay (such as bentonite), concrete, or some other impermeable material, whichever is cost effective.

Underground Storage Tanks - UFGS 33 56 10

Underground storage tanks (USTs) (with a concrete hold-down pad and anchor straps, if required by wet soil conditions) shall be designed and installed in accordance with 40 CFR Parts 280 and 281; NFPA 30, Section 2; and/or State and local codes, whichever is more stringent. The USTs should be double-wall construction of either steel or fiberglass reinforced plastic, whichever is the least costly. (The steel tank is the standard; the fiberglass tank may be bid as an additive alternate.) Steel tanks should be coated with either a coal tar or epoxy and should be cathodically protected or coated with glass fiber-reinforced polyester resin. The USTs should be monitored between the

outer and inner shells by means of a leak detection system with an audible alarm and indicator lights.

Underground piping should be of steel or nonmetallic materials. Steel piping shall be cathodically protected. Steel piping and fittings should be primed and protected with pressure-sensitive organic plastic tape or coated with the same material as used to coat the tank. Double-wall piping may be used.

Fuel Storage Tanks (Compresses Gases) - UFGS 33 56 10

When fuel oil or liquefied petroleum gas (LPG) is selected, a 30-day supply is authorized for the capacity of the storage tank. Fuel storage facilities shall conform to all applicable Federal, State, and local vapor emission and water pollution control (spill planning) regulations. Either above- or underground fuel tanks are authorized.

SECTION 8 MATERIAL HANDLING

DIVISION 41 MATERIAL PROCESSING AND HANDLING EQUIPMENT

Top-Running Overhead Cranes - UFGS 41 22 13.14

(Reference DG-415-2 and DG 415-3 requirements)

CHAPTER 7
SUPPLEMENTAL SUBMISSION REQUIREMENTS

(To be determined and developed As Required)

CHAPTER 8

FUNCTIONAL QUALITY ASSURANCE

8-1 MILESTONE COMPLIANCE ASSURANCE

To verify that all functional and performance goals are being accomplished in the project development process, the design review directives checklists in **Appendix C, TABLE 6-1** should be used in the review exercise performed at the 10 percent, 35 percent, and 95 percent design and documentation submission milestones for each facility type (refer to the facility-type design guide for additional, unique design review directives). These reviews are not intended to be an all-inclusive technical analysis related to design criteria. That responsibility belongs to the State and should be accomplished prior to submission of the documents to NGB-ARI at the milestones. The main focus of the NGB-ARI review shall be on effective incorporation of functional requirements that are both general and unique to the different types of facilities.

8-2 DESIGN REVIEW DIRECTIVES FORMAT

The design review directives are arranged to address the following:

- General project coordination issues
- General issues pertaining to each discipline
- Specific functional issues pertaining to each discipline

Many of the checklist items refer directly to the related technical guidance information in Chapter 6, Common Architecture and Engineering Technical Guidelines, by indication in the left margin. Others make reference to SPiRiT/LEED-NC compliance and related industry standards.

8-3 REVIEW TASKS

Each review task is written in the form of a directive. This format describes the task to be accomplished to ensure compliance with the functional design intent and adequacy of the information related to the requirements of the milestone submission.

APPENDIX A

REFERENCES

The following lists criteria in the form of regulations and industry standards to use in designing ARNG facilities in addition to the references listed in the facility-type design guides. The design A-E should use the current applicable edition of all references.

GOVERNMENT PUBLICATIONS:

1. Executive Office
EO 13423, Strengthening Federal Environmental, Energy and Transportation Management.

Energy Independence and Security Act of 2007 (EISA 2007)
2. U.S. Army Corps of Engineers (USACE)
ETL 1110-1-177, Use of Resin modified Pavement.

ETL 1110-3-481, Containment and Disposal AFFF Solution.

ETL 1110-3-484, Aircraft Hangar Fire Protection Systems.

ETL 1110-3-485, Fire Protection for Helicopter Hangars.

ETL 1110-3-491, Sustainable Design for Military Facilities.

General Instruction Building and Army Continuing Education System Standard Design Criteria.

TI 810-90, Technical Instructions – Elevator

Systems.

Technical Instructions – Structural Design
Criteria for Buildings.

TI 800-01, Design Criteria.

TI 809-04, Seismic Design for Buildings.

TI 810-90, Elevator Systems.

Training Centers – ARNG/USAR Facilities
Standards Booklet.

3. U.S. Green Building Council

USGBC Green Building Rating System
LEED-NC

4. Army National Guard (ARNG)

NGR 415-5, Army National Guard Military
Construction Program Development and
Execution.

NGR (AR) 415-10, Army National Guard
Facilities Construction.

NG PAM 415-12, Army National Guard
Facilities Allowances.

NGR 5-3, Army National Guard Training
Centers (Management).

5. U.S. Department of Agriculture,
Natural Resources Conservation
Service (formerly the Soil
Conservation Service)

TR-55, Urban Hydrology for Small
Watersheds.

<http://www.wcc.nrcs.usda.gov/water/quality/cost.html>

6. Department of the Army

AR 11-27, Army Energy Program.

AR 190-11, Physical Security of Arms,
Ammunition and Explosives.

AR 190-13, The Army Physical Security
Program.

AR 190-51, Security of Unclassified Army
Property (Sensitive and Nonsensitive),
Appendix D.

AR 415-15, Army Military Construction
Program Development and Execution.

AR 420-1, Army Facilities Management.

Army Regulation (AR) 425-15.

DA Form 2028, Recommended Changes to
Publications and Blank Forms.

DA PAM 190-51, Risk Analysis for Army
Property.

TM 5-853-1, Security Engineering Project
Development.

TM 5-853-2, Security Engineering Concept
Design.

7. Department of Defense (DOD)

MIL-HDBK-1022A, Petroleum Fuel Facilities.

UFC 3-600-01, Fire Protection Engineering for
Facilities.

UFC 4-010-01, DOD Minimum Antiterrorism Standards for Buildings.

UFC 3-110-03 Roofing

UFC 3-120-10, Interior Design

UFC 3-400-01, Design: Energy Conservation.

UFC 3-400-02, Engineering Weather Data

UFC 3-440-05N, Tropical Engineering

UFC 3-520-01, Interior Electrical System.

UFC 3-570-2A, Cathodic Protection

UFC 3-580-01, Telecommunications Building Cabling Systems Planning and Design.

UFC 4-610-01, Administration Facilities

UFC 4-722-01, Dining Facilities

8. Department of Energy,
Federal Energy Management
Program (FEMP)

Business Case for Sustainable Design in
Federal Facilities.

9. U.S. Department of Health and Human Services, National Institute for Occupational Safety and Health (NIOSH) Publication No. 2002-139, Guidance for Protecting Building Environments from Airborne Chemical, Biological, or Radiological Attacks.
10. U.S. Department of Labor, Occupational Safety & Health Administration (OSHA) 29 CFR Part 1910, Occupational Safety and Health Standards.

OSHA Standards for General Industry, Walking – Working Surfaces, 1910.21–1910.23.

Fall Protection in General Industry, 29 CFR 1910.
11. Department of Justice 2010 ADA Standard for Accessible Design
.
12. Department of Energy (DOE) FEMP (Business Case for Sustainable Design Construction in Facilities; Interagency Working Group).
13. U.S. Environmental Protection Agency (EPA) Comprehensive Procurement Guidelines, www.epa.gov

EPA 832-R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.
40 CFR Part 280, Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks (UST) and Part 281, Approval of State Underground Storage Tank Programs.
14. U.S. Department of the Navy TM 6290.99-1, Indoor Firing Range Industrial Hygiene Technical Guide.

UG-2030-SUR, User's Guide on Security
Glazing Applications.

TR-2111-SHR, Planning and Design
Considerations for Incorporating Blast
Mitigation in Mailrooms, Loading Docks, and
Entrances.

TDS-2079-SHR, Planning and Design
Considerations for Incorporating Blast
Mitigation in Mailrooms.

15. -----

Federal Specification AA-D-600B, Door, Vault,
Security.

16. -----

Specification FF-H-105.

NON-GOVERNMENT INDUSTRY STANDARD PUBLICATIONS:

- | | |
|--|--|
| 1. American Concrete Institute (ACI)
American Society of Mechanical
Engineers (ASCE), and
The Masonry Society (TMS) | ACI 530/ASCE 5/TMS 402-92,
Building Code Requirements for
Masonry Structures and Commentary.

ACI 318-02, Building Code
Requirements for Structural Concrete
and Commentary. |
| 2. Air Conditioning and Refrigeration Institute | Standards. |
| 3. American Institute of Steel Construction
(AISC) | Specification for Structural Steel
Buildings (Allowable Stress Design
and Plastic Design).

Load and Resistance Factor Design
(LRFD) Specification for Structural
Steel Buildings. |
| 4. American Boiler Manufacturers Association
(ABMA) | Handbooks and standards. |
| 5. American Iron and Steel Institute (AISI) | North American Specification for the
Design of Cold-Formed Steel
Structural Members and Commentary.

Standard for Cold-Formed Steel
Framing – Truss Design. |
| 6. American Conference of Governmental
Industrial Hygienists (ACGIH) | Industrial Ventilation Manual. |

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|---|--|
| 7. American Institute of Architects (AIA) | Handbooks and standards. |
| 8. American National Standards Institute (ANSI) | ANSI A115.1, Steel Door and Steel Frame Preparation for Mortise Locks for 1-3/8 In and 1-3/4 In Doors Standard Specification.

ANSI A120.1, Safety Requirements for Powered Platforms for Building Maintenance.

ANSI B31, Code for Pressure Piping.

ANSI/ASHRAE Standard 62.1-2007, Ventilation for Acceptable Indoor Air Quality. |
| American National Standards Institute/
Builders Hardware Manufacturers Association (ANSI/BHMA) | Handbooks and standards. |
| 9. American Petroleum Institute | Standards. |
| 10. American Society for Testing of Materials (ASTM) | ASTM D2513, Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings.

ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials. |
| 11. American Society of Civil Engineers (ASCE) | Handbooks and standards. |

12. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)	Standard 90.1-2007, Energy Standard for Buildings Except Low-Rise Residential Buildings. Standard 62.1-2007: Ventilation for Acceptable Indoor Air Quality Standard 55-2004: Thermal Environmental Conditions for Human Occupancy Handbooks of: Fundamentals; HVAC Applications; HVAC Systems and Equipment; Refrigeration
13. American Society of Mechanical Engineers (ASME)	Boiler and Pressure Vessel Code.
14. American Society of Plumbing Engineers (ASPE)	Handbooks and standards.
15. Associated Air Balance Council (AABC)	Handbooks and standards.
16. Consumer Product Safety Commission (CPSC)	Window Glazing Standard
17. Illuminating Engineering Society of North America (IESNA)	Lighting Standards.
18. Institute of Electrical and Electronic Engineers (IEEE)	Handbooks and standards.
20. International Fuel Gas Council	International Fuel Gas Code (IFGC). Handbooks and standards.
21. Manufacturers Standardization Society (MSS)	SP-58, SP-69, SP-89, Pipe Hangers and Supports.

- | | |
|--|--|
| 22. Midwest Insulation Contractors Association (MICA) | National Commercial & Industrial Insulation Standards. |
| 23. National Fire Protection Association (NFPA) | National Fire Protection Handbooks.

NFPA 10, Fire Extinguishers.

NFPA 13, Installation of Sprinkler Systems.

NFPA 30, Flammable and Combustible Liquids Code.

NFPA 70, National Electric Code.

NFPA 72, National Fire Alarm Code.

NFPA 78, Lightning Protection Code.

NFPA 90A-02/90 B-02, Installation of Air Conditioning, Ventilation and Warm Air Heating Systems.

NFPA 101, Life Safety Code. |
| 24. National Roofing Contractors Association (NRCA) | Roofing and Waterproofing Manual (http://www.nrca.net/technical/manual/default.asp) |
| 25. Sheet Metal and Air Conditioning Contractors National Association (SMACNA) | Handbooks and standards (duct construction). |
| 26. International Plumbing Code | |

Building Code

27. Sheet Metal and Air Conditioning
Contractors National Association
(SMACNA)

Handbooks and standards
(duct construction).

28. Steel Deck Institute (SDI)

Specifications and Commentary
Diaphragm Design Manual.

29. Steel Joist Institute (SJI) Standard

Specification and Load Tables

30. Telecommunications Industry
Association (TIA)/Electronic
Industries Alliance (EIA)

568A Standard.

31. U.S. Green Building Council

Leadership in Energy and
Environmental Design (LEED™)
Building Rating System.

APPENDIX B

GLOSSARY

B-1 ACRONYMS AND ABBREVIATIONS

AABC	Associated Air Balance Council
AASF	Army Aviation Support Facilities
ABA	Architectural Barriers Act
ABMA	American Boiler Manufacturers Association
ACGIH	American Conference of Governmental Industrial Hygienists
ACI	American Concrete Institute
ADA	Americans with Disabilities Act
ADAAG	ADA Accessibility Guidelines
A-E	Architect-Engineer
AFFF	Aqueous Film Forming Foam
AHU	Air Handling Unit
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
AR	Department of Army Regulation
ARNG	Army National Guard
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASPE	American Society of Plumbing Engineers
ASTM	American Society for Testing and Materials
AT/FP	antiterrorism/force protection

AWI	Architectural Woodwork Institute
BHMA	Builders Hardware Manufacturers Association
Btu	British thermal unit(s)
CBR	California bearing ratio
CCTV	closed-circuit television
CFC	chloro-fluorocarbons
CFMO	construction and facilities management officer
CFR	Code of Federal Regulations
CPSC	Consumer Product Safety Commission
CSI	Construction Specifications Institute
CSMS	Combined Support Maintenance Shops
DA	Department of the Army
DG	Design Guide
DoD	(U.S.) Department of Defense
DOE	(U.S.) Department of Energy
DOIM	Director of Information Management
DWV	drain, waste, or vent
DX	direct expansion
EBU	emergency battery unit
EIA	Electronic Industries Alliance
EO	Executive Order
EPA	(U.S.) Environmental Protection Agency
EPDM	ethylene propylene diene monomer
EPP	environmentally preferred product
ETL	Engineer Technical Letter
F	Fahrenheit
FC	foot-candle(s)
FEMP	Federal Energy Management Program
ft	foot or feet
FTP	file transfer protocol
gpm	gallons per minute

HCFC	hydro-chloro-fluorocarbons
hr	hour(s)
HVAC	heating, ventilation, and air conditioning
IAQ	indoor air quality
IBC	International Building Code
ICBO	International Conference of Building Officials
ICC	International Code Council
IDS	Intrusion Detection System
IEEE	Institute of Electrical and Electronic Engineers
IEQ	indoor environmental quality
IESNA	Illuminating Engineering Society of North America
IFGC	International Fuel Gas Code
IMA	(U.S. Army) Installation Management Agency
in.	inch(es)
J-SIIDS	Joint Services Interior Intrusion Detection System
lb	pound(s)
LCCA	life cycle cost analysis
LED	light-emitting diode
LF	linear foot/feet
LPG	liquefied petroleum gas
MATES	mobilization and training equipment sites
MICA	Midwest Insulation Contractors Association
MILCON	military construction
MIL-HDBK	Military Handbook
MSS	Manufacturers Standardization Society
NCRA	National Roofing Contractors Association
NEC	National Electrical Code
NFPA	National Fire Protection Association
NGB-ARI	National Guard Bureau, Installations Division
NG PAM	(Army) National Guard Pamphlet
NGR	National Guard Regulation

NIOSH	National Institute for Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System
NRCA	National Roofing Contractors Association
OSHA	Occupational Safety & Health Administration
PAM	Pamphlet
POL	petroleum, oils, and lubricants
POV	privately owned vehicle
PPE	personal protective equipment
psi	pounds per square inch
PVC	polyvinyl chloride
RCAS	Read Clear All Scalars
RH	relative humidity
SDI	Steel Deck Institute
SJI	Steel Joist Institute
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SPiRiT	Sustainable Project Rating Tool
SWPPP	stormwater pollution prevention plan
TI	Technical Instruction
TIA	Telecommunications Industry Association
TM	Technical Manual
TMS	The Masonry Society
TR	Technical Release
UBC	Uniform Building Code
UFAS	Uniform Federal Accessibility Standards
UFC	Unified Facilities Criteria
UL	Underwriters Laboratories
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USPFO	U.S. Property and Fiscal Office
UST	underground storage tank

VE	value engineering
VOC	volatile organic compound
yd	yard(s)

B-2 SPECIALIZED TERMS

exclusive standoff zone	the controlled area surrounding a structure, into which only service and delivery vehicles are allowed
level of protection	the degree to which assets are protected against injury or damage from an attack by an aggressor
Life Cycle Cost Analysis (LCCA)	a systematic means of evaluating the building energy and conditioned space systems for practicality by measuring initial cost against beneficial use over an extended period of time
nonexclusive standoff zone	the controlled area that is used in conjunction with an exclusive standoff zone but provides less restrictive land use

**APPENDIX C
DESIGN REVIEW CHECKLISTS

FOR

DESIGN BID BUILD D/B/B**

NOTE:

**IF CONTRACT IS DESIGN BUILD D/B USE MILCON EXECUTION SLIDE GUIDE
ON PAGE 132 OF THIS DESIGN GUIDE TO INTERPOLATE DESIGN REVIEW
CHECKLIST**

Table 6-1. Design Review Directives

Table 6-1. Design Review Directives					
GENERAL COORDINATION ISSUES		SUBMISSION			
		SUBMITTALS (10%)	CONCEPT (30%)	PRELIMS (60%)	FINAL (90%) BFI (100%)
1-3.20	SITE DEVELOPMENT				
	A complete site survey report has been provided. Before project initiation, the CFMO should provide the design A-E with an approved working or preliminary master plan for the proposed facility site. The State Military Department should provide special instructions for any deviations from the master plan.				
	Soil Bearing Capacity Declaration and Declaration of Uniformity of Soil Conditions (if applicable) have been provided for the current development and areas of future expansion.				
	Storm water permit and pollution prevention plan have been obtained/approved.				
	ARNG Environmental Checklist and Record of Consideration have been reviewed, and a record is included in the narrative.				
	An Environmental Impact Statement has been completed and approved by the governing agencies.				
	FUEL-DISPENSING SYSTEMS				
	Size of concrete pad and slab design comply with standards.				
	Utility connections meet capacity required based on check of criteria.				
	Spill containment provisions are adequate to meet requirements.				
4-8.0	Capacity of fuel tanks meets authorized requirement.				
	WASH PLATFORM				
	Size of concrete pad and slab design comply with standards.				
	Water drainage and effluent disposal meet environmental requirements.				
	Water service is adequate based on check of calculations.				
	MAINTENANCE				
	Vehicular maintenance areas and equipment comply with environmental criteria and OSHA requirements.				

Table 6-1. Design Review Directives

GENERAL COORDINATION ISSUES	SUBMISSION				
	SUBMITTALS (10%)	CONCEPT (30%)	PRELIMS (60%)	FINAL (90%)	BFI (100%)
1-3.17.1 Safety provisions for the building equipment maintenance area comply with OSHA requirements, including roof perimeter restraints when rooftop equipment is part of the mechanical, electrical, and communications systems.					
Site and building construction materials and details meet the project specific levels of antiterrorism and force protection.					
The U.S. Department of Labor, Occupational Safety & Health Administration (OSHA) Standards for General Industry in 29 CFR Part 1910 and DA PAM 40-503, Industrial Hygiene Program, requires that ARNG provide a safe and healthy workplace for its employees. All Readiness Centers with Indoor Firing Ranges, Logistics and Aviation Maintenance facilities must have an Industrial Hygiene / Chief Surgeon's Office (ARNG-CSG-P) technical review prior to construction.					

Table 6-1. Design Review Directives					
ACCESSIBILITY REQUIREMENTS	SUBMISSION				
	SUBMITTALS (10%)	CONCEPT (30%)	PRELIMS (60%)	FINAL (90%)	BFI (100%)
1-3.7 The site and building design comply with accessibility requirements for the following conditions based on check of the plans and the narrative.					
Path of travel to the building, including drop-off areas					
Building entrances including doors and vestibules					
Horizontal circulation throughout the building, excluding maintenance areas					
Emergency egress routes					
Toilet, shower, and locker facilities					
Drinking fountains					
Public telephones					

Table 6-1. Design Review Directives					
SITE AND CIVIL ENGINEERING	SUBMISSION				
	SUBMITTALS (10%)	CONCEPT (30%)	PRELIMS (60%)	FINAL (90%)	BFI (100%)
SITE / CIVIL - SUPPORTING DOCUMENTATION					
Based on review, the site survey information includes all existing vegetation, topography, floodplains, rights-of-way, and utility connections at the site perimeter, and all dimensioning is complete.					
Based on review of the Geotechnical Report, adequate soil testing has been done within the proximity of the building construction, including potential areas of expansion.					
Declaration of Soil Bearing Capacity and Declaration of Uniformity of Soil Conditions have been signed and included with the Geotechnical Report.					
State code and environmental regulations have been identified and are being followed as described in the narrative and code analysis					
The Environmental Impact Statement requirements are being followed in the design.					
SITE / CIVIL - GENERAL					
Calculation confirms that the authorized amount of parking is being provided.					
Review of the site plan indicates antiterrorism standoff areas are in compliance with the project-specific threat assessment and allow for potential future expansion by review of the site plan.					
Check of the site plan indicates security perimeters are clearly defined and have no breaches					
SITE / CIVIL - SUSTAINABILITY					
LEED Review of the narrative confirms that all site design sustainable goals have been clearly defined and are realistic within the project budget. (Support documentation for the SPIRiT program is being developed and included in documentation at each milestone as the project progresses.)					

Table 6-1. Design Review Directives						
SITE AND CIVIL ENGINEERING		SUBMISSION				
		SUBMITTALS (10%)	CONCEPT (30%)	PRELIMS (60%)	FINAL (90%)	BFI (100%)
SITE / CIVIL - BASIC DESIGN						
2200	Cut and fill calculations have been provided; based on review, they reflect balance, or the amount of off-site material required or on-site material removed has been determined.					
2200	General review of proposed final design grading reflects no extremes in topography, and retaining walls are indicated as necessary.					
2370	Based on check of the specifications, erosion control has been adequately addressed.					
2500	Based on review of the narrative and indications on the perimeter of the site survey, all available utilities have been indentified; they are of adequate size to support the new project based on appropriate calculations.					
2500	Based on review of related details, adequate protection of utility elements on grade is provided.					
2500	Based on review of the site plan, utility lines from connection at the site perimeter to the building(s) are the shortest practical distance.					
2501	The fire protection water loop is provided with hydrants placed as required by the local jurisdiction, and is confirmed in writing.					
2630	Based on review of the drawings and narrative, storm drainage design includes a retention basin with support calculations or a stormwater permit for off site drainage.					
2750	Pavement standards have been incorporated into the specifications and cover all conditions for drives, parking, walkways, and site structures.					
SITE / CIVIL - LANDSCAPING						
2810	Irrigation and landscape plans are coordinated for adequate sprinkler coverage based on plan overlay.					
2890	Facility signage meets standard and is adequate for all site entry points based on check of the site plan and specifications					
2930	Landscape species are appropriate for the local environment based on related information included in the design narrative					

Table 6-1. Design Review Directives					
SITE AND CIVIL ENGINEERING	SUBMISSION				
	SUBMITTALS (10%)	CONCEPT (30%)	PRELIMS (60%)	FINAL (90%)	BFI (100%)
SITE / CIVIL - COST ESTIMATING Based on review of the cost estimate, all of the items in the following categories required in the project design have been adequately addressed: Site preparation and demolition Site improvements and landscaping Site utilities Connecting tunnels and bridges <u>Other site systems</u>					

Table 6-1. Design Review Directives						
STRUCTURAL ENGINEERING		SUBMISSION				
		SUBMITTALS (10%)	CONCEPT (30%)	PRELIMS (60%)	FINAL (90%)	BFI (100%)
SEISMIC DESIGN CONSIDERATIONS						
1102	An evaluation of the building configuration (plan and massing) related to transfer of seismic loads has been done and is included in calculations and narrative.					
	Building expansion joints and/or seismic joints are shown on floor plans.					
FOUNDATIONS						
3051	Any development restrictions or other recommendations of the geological investigation have been followed to including building size and location on site.					
3051	The foundation system is in compliance with the Geotechnical Report and takes into account expansive soils, corrosive soils, and any other special characteristics.					
SLAB ON GRADE						
	Floor slabs on grade are being designed based on the recommendations of the Geotechnical Report as described in the narrative.					
GENERAL REQUIREMENTS						
	Live loads have been selected to suit any special requirements of the project based on review of the calculations and narrative.					
	Review of the narrative indicates that equipment having excessive noise and/or vibration has been identified, and proper structural isolation is incorporated into the design					
	Blast and progressive collapse studies have been included and explained in the narrative.					
	Provision of floating slabs to mitigate equipment noise and vibration isolation requirements are identified.					
	The design includes compliance with regard to accommodating maintenance equipment, and when the building is 40 ft or					

Table 6-1. Design Review Directives

STRUCTURAL ENGINEERING		SUBMISSION				
		SUBMITTALS (10%)	CONCEPT (30%)	PRELIMS (60%)	FINAL (90%)	BFI (100%)
LEED	higher, details at the building perimeter are provided for service equipment supports.					
	Structural systems have been coordinated with fire resistance requirements and protection is identified in the narrative.					
	Specifications call for recyclable products in concrete and cement mixes to the maximum extent allowable, and to the maximum available in structural steel.					
	Structural design has incorporated support for crane systems in maintenance areas.					
	The cost estimate has been checked for inclusion of all structural system components					

Table 6-1. Design Review Directives					
ARCHITECTURAL DESIGN		SUBMISSION			
		SUBMITTALS (10%)	CONCEPT (30%)	PRELIMS (60%)	FINAL (90%) BFI (100%)
GENERAL DESIGN CONSIDERATIONS					
	Based on review of the space program and floor plan layouts, all program requirements are incorporated with optimal functional relationships.				
	Areas with incompatible noise and/or vibration tolerances are remote from one another or are segregated by neutral building elements.				
LEED	The building orientation is in accordance with the site analysis and energy modeling.				
LEED	The building massing configuration and envelop design are in accordance with the related architectural characteristics in the energy analysis model that is used to set the annual energy budget.				
	Building entry and circulation routes are in accordance with security assessment requirements				
	Functional expansion capabilities have been thoroughly analyzed.				
	Custodial and designated facility storage areas have been sized and located appropriately, including direct loading dock access.				
	Dimensions are adequate for vehicular circulation at all service dock areas based on check of the accommodation of the largest vehicles anticipated.				
LEED	Open office areas are not isolated from exposure to natural light by continuous perimeter enclosed functions.				
	A formal vertical transportation study has been performed by a specialist, and the results are reflected in the narrative and the building design.				
	Appropriate methods of access to the roof for servicing equipment are provided and approved in writing by facilities management.				
OSHA	Provisions are included for the method of compliance with OSHA Standard 29 in CFR 19.66 and ANSI A120.1 for accommodating maintenance equipment servicing when a building is 40 ft or higher.				

Table 6-1. Design Review Directives					
ARCHITECTURAL DESIGN		SUBMISSION			
		SUBMITTALS (10%)	CONCEPT (30%)	PRELIMS (60%)	FINAL (90%) BFI (100%)
8500	All acoustic performance requirements are met, and the method of achieving them is described in the narrative.				
	Expansion joints needed due to the length of the building and configuration are determined by a structural engineer and indicated on the architectural plans.				
	All interior pollutant-generating sources (copy rooms, janitor closets, chemical storage areas, etc.) are isolated with separate outside exhaust and slab-to-slab partitions.				
	All exterior finishes have been defined in the narrative, details, and cost estimates.				
LEED	Based on calculations and the narrative, glazing systems are designed as low conductive thermal barriers.				
	All interior finishes have been defined in detail in the finish schedules.				
8710	All required hardware types are identified in the schedule				
LEED	Power, data, and telecommunications connectivity at workstations and in meeting areas meet capacity and flexibility requirements.				
	Building fire protection standpipe system is included on the drawings.				
	Blast-resistant materials, systems, and details are integrated into the building perimeter with regard to the project-specific threat assessment.				
	Review of details and specifications indicate that buildings in areas with severe weather conditions have entry mats integrated with grills or grates and drainage systems in vestibules.				
	Dock levelers or scissor lifts are provided to accommodate various truck bed heights in the drawings and specifications.				

Table 6-1. Design Review Directives						
ARCHITECTURAL DESIGN		SUBMISSION				
		SUBMITTALS (10%)	CONCEPT (30%)	PRELIMS (60%)	FINAL (90%)	BFI (100%)
LEED	Performance requirements for testing thermal resistance of the building envelop construction (thermal graphic imaging) have been incorporated into the specifications.					
10440	Review of details and specifications indicate that a comprehensive signage and graphics program has been developed based on a thorough review of paths of travel including all interior conditions, and meets standards.					
LEED	Forrest Stewartship Council principles and criteria are met for specified wood products.					
LEED	Paints and coatings comply with Green Seal standard based on review of specifications.					
LEED	Adhesives and sealants comply with VOC content limits described in LEED guidelines.					
NCRA	Roofing design and penetrations follow standards based on specifications and detail references.					
SMACNA	Flashing details follow standards					
	The architect has confirmed, based on diagrams, that servicing and parts replacements can be accomplished within the dimensional limits of equipment rooms.					
	Based on the narrative, a minimum roof slope of 1/50 is provided and that the architect has coordinated this requirement with the structural engineer.					
	Based on review of details and specifications, dock areas are protected from extreme climatic conditions by overhead rolling doors and dock seals where appropriate.					
	Based on check of the specifications, overhead-supported toilet partitions are being used throughout the facilities.					
AWI	Based on specification requirements, all architectural woodwork is designed according to the AWI Quality Certification Program.					
	Suspended ceiling bracing is incorporated where seismic zones dictates and related details are included in the drawings.					

Table 6-1. Design Review Directives					
ARCHITECTURAL DESIGN		SUBMISSION			
		SUBMITTALS (10%)	CONCEPT (30%)	PRELIMS (60%)	FINAL (90%) BFI (100%)
LEED	Based on specification, carpet systems meet or exceed the Carpet and Rug Institute Green Label Indoor Quality Test.				
	Based on review of reflected ceiling and equipment plans, ceiling access to equipment above is through lay-in ceiling systems to the maximum extent possible.				
	Cost estimate includes all architectural components.				
10100 10670	All requirements for specialties including markerboards, tackboards, and shelving are included in the documents.				

Table 6-1. Design Review Directives						
MECHANICAL ENGINEERING		SUBMISSION				
		SUBMITTALS (10%)	CONCEPT (30%)	PRELIMS (60%)	FINAL (90%)	BFI (100%)
GENERAL DESIGN CONSIDERATIONS						
LEED	The design target for annual energy budget has been determined and the mechanical design is in accordance with related modeling of the architectural design.					
	Utility service availability has been determined and outlined in the narrative.					
	The narrative identifies acoustic and/or vibration isolation needs for spaces near HVAC equipment.					
LEED	The extent of sub-metering required has been determined in writing.					
	LEED sustainability and energy conservation goals have been defined and continually reviewed for compliance.					
	Functional layouts of architectural plans have been assessed to optimize efficient air handler zones, and zones are aligned separately between fully occupied areas and partially occupied areas.					
LEED	Equipment will be located above the 100-year floodplain.					
	The building automation system will follow LEED recommendations.					
	Based on calculated service clearances and pathway dimensions, adequate room is provided for major equipment replacement.					
LEED	Based on confirmation in writing, the facilities engineering staff has the training and expertise to maintain and operate the proposed HVAC systems and controls.					
	High maintenance equipment for every system has been described in the narrative.					
	Based on description in the narrative, optimum flexibility is designed into the systems for classrooms, meeting spaces, and assembly halls.					
LEED	HVAC equipment will not be visable from the exterior of the building.					
	Effective methods for providing off-hour HVAC operation have been defined and are included in the narrative					

Table 6-1. Design Review Directives

Table 6-1. Design Review Directives						
MECHANICAL ENGINEERING		SUBMISSION				
		SUBMITTALS (10%)	CONCEPT (30%)	PRELIMS (60%)	FINAL (90%)	BFI (100%)
LEED	Based on Life Cycle Cost Analysis, HVAC alternatives have been considered					
	The limits imposed by value engineering decisions are clearly identified in writing.					
	An air flow balance for off-hours of operation has been calculated..					
	The level of plant equipment redundancy has been established by the A-E and facility maintenance staff and is reflected in the preliminary equipment schedule and the narrative.					
	A detailed preliminary Commissioning Plan, including requirements for implementation strategy, has been incorporated into the narrative and specification language.					
LEED	Economic viability of all LEED credits is checked and updated at each phase.					
1-3.12	Description in the narrative indicates compliance with all seismic zone requirements for stabilizing equipment will be done.					
	Provision is made for appropriate access to service equipment that cannot be maintained from ground floor level.					
	Based on placement on the site plan drawings, underground or above-ground mounted storage tanks will not be located close to buildings, railroad trackss, or roads.					
	Service agreements and appropriate durations are incorporated into the specifications, and a list of all necessary provisions is included in the narrative.					
	Specifications call for all necessary training and a thorough spare parts list under each related category, and indicate the extent of the requirements provided as a list in the narrative.					
	An analysis has been performed to verify the need of water treatment for boilers, humidifiers, and cooling towers; and if required, it is addressed in the specification is addressed in the specifications.					
	All warranty requirements for mechanical equipment are included in the respective specification sections, and all the specfic warranties are listed in the narrative.					

Table 6-1. Design Review Directives					
MECHANICAL ENGINEERING		SUBMISSION			
		SUBMITTALS (10%)	CONCEPT (30%)	PRELIMS (60%)	FINAL (90%) BFI (100%)
LEED	Based on listing in the narrative, building automation system control and monitoring points meet minimum requirements.				
	Specifications contain instructions to bidders for documentation and product literature necessary to support the LEED goals.				
	Cost estimate includes all mechanical system components.				

Table 6-1. Design Review Directives						
PLUMBING ENGINEERING		SUBMISSION				
		SUBMITTALS (10%)	CONCEPT (30%)	PRELIMS (60%)	FINAL (90%)	BFI (100%)
LEED	The potential for gray water use is described in the narrative.					
	A metering strategy to effectively monitor water consumption from an overall efficiency standpoint is used and described in the narrative.					
	Water service, sanitary drainage, and storm drainage calculations are completed and summarized in the narrative.					
	Domestic water heating approach (storage, instantaneous, circulated, points-of-use) has been determined and included in the narrative.					
	Preliminary water pressure has been determined, and the narrative describes whether pumping will be necessary.					
	Requirements for sewage ejectors and/or sump pumps are identified in the narrative.					
	Pipe and insulation materials have been identified in the specifications.					
	The intent to meet or exceed water conservation standards is economically viable based on cost analysis.					
	Toilet fixture count is adequate for occupancy and accessible accommodation is being provided by standard as indicated in the narrative.					
	Geotechnical Report has been reviewed, and provision is included for foundation and/or underslab drainage system as indicated in the narrative and specifications.					
	Specifications provide for grease interception and/or recovery for kitchen fixtures and drains.					
	Based on check of specifications, fuel storage tanks are provided with leak detection and alarm.					
	Natural gas meter and service pressure regulator are protected from vehicular damage, foundation settlement, and vibration					
	Cost estimate includes all plumbing components.					
	Pipe sizes are coordinated with utility connections by check of the site survey information.					

Table 6-1. Design Review Directives

ELECTRICAL		SUBMISSION				
		SUBMITTALS (10%)	CONCEPT (30%)	PRELIMS (60%)	FINAL (90%)	BFI (100%)
LEED	Commitments to energy management have been established including lighting controls and energy monitoring systems, and are indicated in detail in the narrative.					
	Based on analysis in the narrative, all existing building electrical systems and power source(s) are adequate for expansion or renovation loads.					
	Requirements for cathodic protection have been determined from the Geotechnical Report, and if needed are defined in the narrative.					
	All special equipment power requirements are identified by listing in the narrative.					
	Utility rebate programs have been investigated for availability and applicability.					
	The narrative indicates that adequate service and expansion space has been provided at major equipment locations.					
	The electrical system is being designed with adequate spare capacity by listing in the narrative.					
	Statement in the narrative indicates that all electrical equipment is located above the floodplain.					
	All lighting control conditions are defined in the narrative					
	The site lighting design minimizes lighting intensity off site by incorporating directional fixtures at the perimeter.					
	UPS is provided in the electrical requirements for critical service items listed in the narrative.					
	Lightning protection requirements have been defined in the narrative.					
	A separate green, insulated equipment ground conductor has been incorporated into all feeder and branch circuits by					
LEED	Mercury-free transformers and lamps are being specified.					

Table 6-1. Design Review Directives

Table 6-1. Design Review Directives						
ELECTRICAL		SUBMISSION				
		SUBMITTALS (10%)	CONCEPT (30%)	PRELIMS (60%)	FINAL (90%)	BFI (100%)
LEED	Emergency generators have adequate ventilation and are located away from HVAC air intakes; and sound and/or vibration isolation is provided.					
	Based on check of schedules, panels have at least one circuit breaker per 200 ft2 of coverage in office areas.					
	Based on check of schedules, panelboards have adequate spaces and spares.					
	Daylighting sensors are called for on the building perimeter and included in the specifications.					
	The building automation system includes the requirements and has the capacity to monitor normal, emergency, and uninterruptible power; mechanical systems and controls; fire detection and suppression; security systems; lighting; communication equipment; gas; and exhaust..					
	Receptacles placed for cleaning are located in all open spaces and corridors.					
	Based on check of diagrams and floor plans, electrical service has been provided for all related site elements including lighting and security systems.					
	One emergency receptacle has been placed in each electrical closet, communications equipment room, mechanical room, and electrical equipment room.					
	Cost estimate includes all electrical system components					
	Lighting power budget calculations have been provided if required by the energy code.					
	Door schedule indicates special items, including fire alarm hold open, security devices, and power-operated doors.					
	There is clear indication of division of work between building contractor and utility company.					
	Battery-powered lights have been provided in the generator and switchgear rooms.					
	A minimum of 10% spare breakers in panelboards have been provided.					
LEED						

ELECTRICAL	SUBMISSION				
	SUBMITTALS (10%)	CONCEPT (30%)	PRELIMS (60%)	FINAL (90%)	BFI (100%)
All quantities of outlets, spacing, and type meet program requirements.					
Based on review, lighting calculations meet energy code.					
Based on check of drawings, location of structural foundations and and electrical ductbanks are not in conflict.					
By check of schedules, all lighting type and space illumination levels meet program requirements					
By check of schedules and code requirements, all emergency lighting requirements are met.					

Table 6-1. Design Review Directives					
FIRE PROTECTION	SUBMISSION				
	SUBMITTALS (10%)	CONCEPT (30%)	PRELIMS (60%)	FINAL (90%)	BFI (100%)
All Federal, state, and local codes and amendments are included in the narrative.					
The local water supply has sufficient capacity for future expansion of the fire protection system.					
Fire access roads are not in conflict with future building plans on the proposed site, and access is provided 24 hours a day when the roads are behind security barriers.					
The emergency generator has been specified with extra capacity for future loads as described in the narrative.					
Water tank sizes have extra capacity for future expansion as described in the narrative.					
UL assembly numbers, compartmentalization, rated walls, and penetration conditons are indicated on the drawings.					
Based on check of the specifications, the fire alarm system includes capacity for future expansion.					
Dimensional check shows that the location of major fire protection equipment, to include fire pumps is accessible for service.					
Fire extinguishers and/or cabinets are located on the plans.					

**APPENDIX D
FIGURES/LIST**

Figure 1. Small Kitchen Equipment Layout

Figure 2. Large Kitchen Equipment Layout

FOOD SERVICE EQUIPMENT LIST

FIGURE 3 PCU IN A SCIF

MILCON EXECUTION SLIDE GUIDE

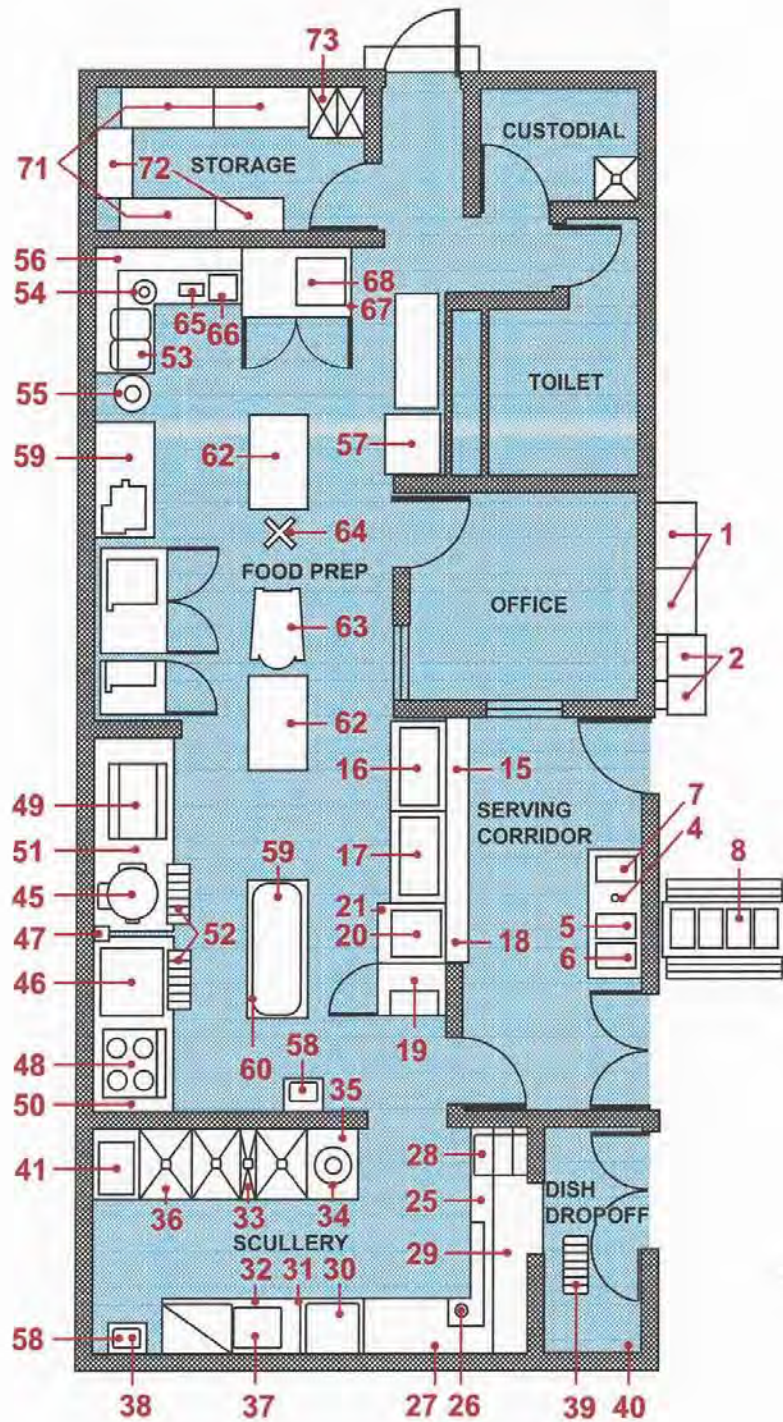


Figure 1. Small Kitchen Equipment Layout

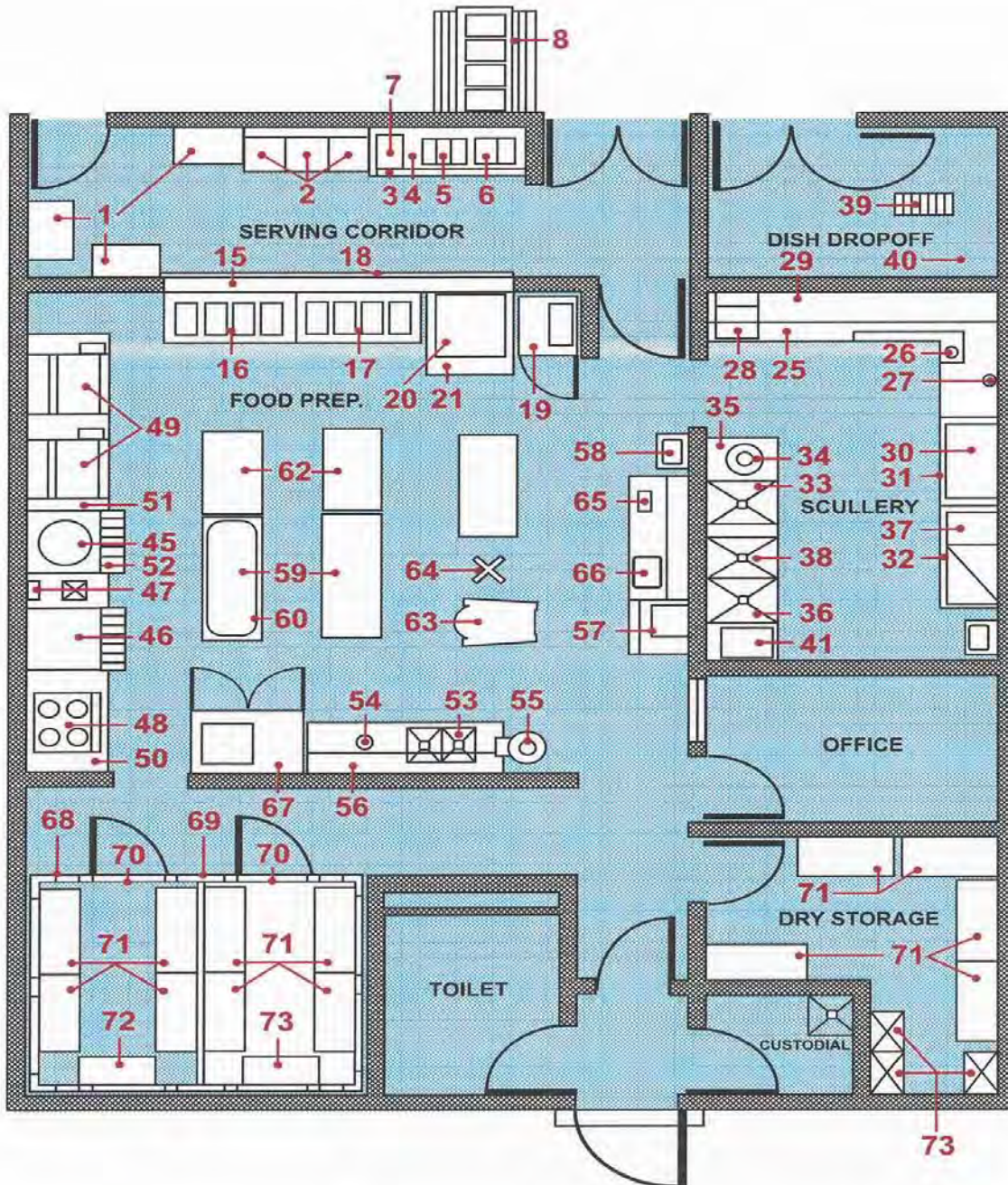


Figure 2. Large Kitchen Equipment Layout

Self-Serve, Beverage, Salad, and Dessert Areas:

- 1 Dispenser Regular -Service Tray and Silverware
- 2 Dispensers - Tableware
- 3 Stand - Drinks
- 4 Water Cooler
- 5 Dispenser - Juice
- 6 Urn - Coffee
- 7 Ice Dispenser
- 8 Cold Food Counter
- 9 to 14 Not Used

Serving Line Area:

- 15 Serving Counter
- 16 Cold Pan (Drop-in)
- 17 Hot Food Table (Drop-In)
- 18 Tray Slide
- 19 Food Warming Cabinet
- 20 Griddle
- 21 Exhaust Hood
- 22 to 24 Not Used

Scullery Area:

- 25 Soiled Dish Table
- 26 Garbage Disposal
- 27 Spray Assembly
- 28 Soaking Sink
- 29 Wall-Mounted Shelf
- 30 Dishwashing Machine
- 31 Exhaust Hood - Dishwasher
- 32 Dish Table
- 33 Pot and Pan Sink
- 34 Garbage Disposal
- 35 Spray Assembly
- 36 Water Heater - Under Sink
- 37 Water Heater
- 38 Exhaust Hood - Over Sink
- 39 Floor Trough
- 40 Spray Assembly
- 41 Water Heater
- 42 to 44 Not Used

Kitchen, Storage, and Refrigeration Areas

- 45 Steam Kettle - Jacketed
- 46 Frying and Braising Pan
- 47 Water Meter
- 48 Heavy Duty Range
- 49 Baking and Roasting Oven
- 50 Exhaust Hood
- 51 Exhaust Hood
- 52 Floor Trough
- 53 Vegetable Preparation Sink
- 54 Garbage Disposal
- 55 Vegetable Peeling Machine
- 56 Wall-Mounted Shelf
- 57 Ice Machine
- 58 Hand Sink
- 59 Food Preparation Table
- 60 Kitchen Utensils Rack
- 61 Not Used
- 62 Food Preparation Table
- 63 Food Mixing Machine
- 64 Mixer Stand
- 65 Can Opener
- 66 Meat Slicing Machine
- 67 Frozen Food Cabinet
- 68 Refrigerator
- 69 Refrigerator (Not in Small Kitchen)
- 70 Plastic Strip Doorway Closure
(Not in Small Kitchen)
- 71 Shelving
- 72 Wall Lockers
- 73 Hand Shelf Truck
- 74 Air Curtain Machine (Fly Control)

Food Service Equipment List

ARMY NATIONAL GUARD FOOD SERVICE EQUIPMENT SCHEDULES

ITEM NO.	ITEM DESCRIPTION	LOG Class	MILCON	OMARNG	NATIONAL STOCK NUMBER	SPECIFICATION COMMERCIAL	REMARKS	UTILITIES
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SELF-SERVE, BEVERAGE, SALAD AND DESSERT AREAS:

1	DISPENSER, RECTANGULAR, Service Service Tray, Automatic W/Silverware Holder, Stainless Steel	C		X	7320-01-009-2867	COMMERCIAL	8 Silverware Holders, For Dispensing Trays	
2	DISPENSERS, Tableware, Self-Leveling, Cups, Bowls Tumbler, Stainless Steel	C		X	7320-00-738-8404	COMMERCIAL	(Cups, Bowls And Tumblers, Unheated) (Cantilevered, Carrier), Size (20"x20" Racks (Mobile Casters),	
3	STAND, Drink, (Hot/Counter) Stainless Steel	A	X		NNSN	BUILT TO ORDER AS PER PLAN	Mariner Edge Top, W/Tray Slide, Drain Trough and Drain Line	2" Drain Line
4	GLASS FILTER WATER COOLER	A	X				Mounted on the Stand, Drink (Hot) Counter, Stainless Steel	
5	DISPENSER, Juice, Mechanically Refrigerated, Electric, Triple	C		X	7310	COMMERCIAL	(Dispenser W/Agitation System But W/O Aeration System), For Pulpy Fruit Juice, and other Beverages not suitable for Aeration, (Triple Bowl), (capacity of 5 to 6 gallons per bowl) 15-18 gallons total capacity inclusive, Counter-Mounted Separate Toggle Switch Req'd For Independent Bowl) Operation	Electric, 115 V, 60HZ 1PH, 1/5HP, ncma 5-15 Plug
6	URN, Coffee, Twin, Automatic, 6 Gallon Capacity, Electric OR	A	X		7310	COMMERCIAL	(Counter or Stand Mounted, Twin or Single URN) (3-Gallon Capacity Each Compartment), (Electric Heated), Use with Item #3.	Electric, 208V, 60HZ, 3PH, 12KW, 1/2" CW Inlet
	URN, Coffee, TWIN, Automatic, 6-Gallon Capacity Gas		X		7310	COMMERCIAL	(Counter or Stand Mounted, Twin or Single URN) (3-Gallon Capacity Each Compartment), (Gas Heated, Not applicable to Single Unit), Use with	Gas, 45,000 BTU Electric, 115V, 60HZ, 1PH, 1/2" CW Inlet

ARMY NATIONAL GUARD FOOD SERVICE EQUIPMENT SCHEDULES

ITEM NO.	ITEM DESCRIPTION	LOG Class	MILCON	OMARNG	NATIONAL STOCK NUMBER	SPECIFICATION COMMERCIAL	REMARKS	UTILITIES
							Item #3, Furnished To Operate on Natural Gas	
7	ICE DISPENSER, Load, W/Automatic Dispensing Head, 150 LBS Storage Capacity	A	X		NNSN	COMMERCIAL	Stainless Steel Exterior, Stainless Steel Evaporator, Manual Fill Access Door	Electric, 115V, 60HZ, 1PH, 15 AMPS, 1/4HP
8	COLD FOOD COUNTER, Mechanically Refrigerated Mobile, Self Contained, Electric, 4 Compartment	C		X	7310-01-077-6502	COMMERCIAL	(4 Food Storage Pan Capacity W/Bumpers & Casters Sneeze Guard W/Tray Rail On Both Sides	Electric, 110V, 60HZ, 1PH, 1/2" Drain

ITEM NUMBERS 9-14 NOT USED

SERVING LINE AREA

15	COUNTER, Serving, W/8 Opening SEE DETAIL DRAWINGS AND PLAN 4.03, 4.04, 4.04A AND 3.04 W/Sneeze Guard and Pastry Display	A	X		NNSN	BUILT TO ORDER	Stainless Steel, Used to Support Items 16 & 17, Sneeze Guard and Double Deck Pastry Display	None
16	COLD PAN, Drop-In, Mechanically Refrigerated, 1 Piece Construction Typical Producer: Atlas Metal Industries, 4 Compartment w/pastry display	A	X		NNSN	COMMERCIAL	Condensing Unit Located Below Cold Pan, On/Off Switch, W/Adapter Bars, 3 Opening Capacity, Stainless Steel	Electric 115V, 60HZ, 1/4HP, 6AMPS
17	TABLE, Hot Food, Drop-In, Electric Stainless Steel, W/Drain, Size 4, (4 Compartment) 15 Watts, Per Opening, Typical Producer: Atlas Metal Industries	A	X		NNSN	COMMERCIAL	(3 Food Storage Compartment), 12 Inch Pans X 20 inch Food Storage Pans, (With Drain), 1500 Watts Per Opening	Electric, 220V, 60HZ, 3HP, 9KW
18	TRAY SLIDE, Stainless Steel, mounted on wall (see detail drawing and plan 4-04)	A	X		NNSN	CUSTOM BUILT	Mounted on Top o Concrete /Block wall, Tray Slide To Accommodate 14"W X 18"L Tray, Use with Items 15, 16, and 17	NONE
19	CABINET, Food Warming, Reach-In Electric	A	X		7310-01-086-2867	COMMERCIAL	Modified Commercial 2 Compartment Each Compartment	Electric, 208V 60HZ, 1PH

ARMY NATIONAL GUARD FOOD SERVICE EQUIPMENT SCHEDULES

ITEM NO.	ITEM DESCRIPTION	LOG Class	MILCON	OMARNG	NATIONAL STOCK NUMBER	SPECIFICATION COMMERCIAL	REMARKS	UTILITIES
							Shall Hold Ten or More 12"X20" X 4" Pans, and A Minimum of Thirteen 18"X 26" Bun Pans, or Trays of 12: X 20"X 2" Food Service Pans	
20	GRIDDLE, Self-Heating, Electric W/Griddle Stand (38"W, 34"D, 26"H) OR	A	X		7310	COMMERCIAL	Open Frame, Griddle Stand Leg Mounted, with support brackets	Electric, 208/230V 60HZ, 3PH, 14KW
	GRIDDLE, Self Heating, Gas Fired, W/Griddle Stand, (36"W, 34"D, 26"H)	A	X		7320-01-295-4308		Griddle Stand, Stationary, (Leg mounted), W/Quick Gas, Disconnect, (Furnished to Operable On Natural Gas)	Gas, 81,000 BTU 115V, 60HZ, 1PH Power Control
21	HOOD, EXHAUST, W/Grease Automatic Wash down system, Stainless Steel	A	X		NSN	BUILT TO ORDER AS PER PLAN	W/Vapor Proof Fluorescent Lights, W/Enclosure Panels, (Ends Closed), W/Fire Suppression system, (Chemical or Water), fire/fuel delay Timer included NFPA 13 & 96.	Electric Motor Water

ITEM NUMBER 22-24 NOT USED

SCULLARY AREA

25	DISH TABLE, Soiled, W/Scrap Trough Pre wash Sink, (W/Faucet And Drain Lever. Build slot in wall to allow silverware to be dropped in sink.	A	X			BUILT TO ORDER AS PER PLAN	Constructed Of 14 Gauge Stainless Steel, With 6" Back splash, W/Scrap Trough	
26	GARBAGE DISPOSAL MACHINE Typical Producer: Salvajor 5 HP II Model 500	A	X		4540	COMMERCIAL	5HP Stainless Steel, Control Center, Circuit Breaker, Automatic Reversing, Positive Flush, 6-8" Diameter Throat Cut-out, Used with Item #25 Dish washing Area.	Electric, 208V, 60HZ, 3HP, 1/2" CW
27	SPRAY ASSEMBLY, Pre-rinse, Wall mounted	A	X		NNSN	COMMERCIAL	W/Wall Bracket, (Horizontal) Water Supply, Spray W/Water Mixing Control Valve, (7 1/4" to 8 1/4" on center) Self Closing Spray Valve	1/2" HW & CW IPS Female Inlet

ARMY NATIONAL GUARD FOOD SERVICE EQUIPMENT SCHEDULES

ITEM NO.	ITEM DESCRIPTION	LOG Class	MILCON	OMARNG	NATIONAL STOCK NUMBER	SPECIFICATION COMMERCIAL	REMARKS	UTILITIES
28	SINK, Silver, Soak, Stainless Steel, 34 Deep, Mobile, W/Lever Drain Valve, Part of Item #25 Built in W/Removable Basket	A	X		7320-01-295-4308	COMMERCIAL	Stainless Steel, Sink Built Into Soil Dish table, W/Stainless Steel, Wall Slot From the Drop Off Corridor Wall (Drop Off Window)	NONE
29	SELF, Wall Mounted	A	X		7310-NNSN	BUILT TO ORDER AS PER PLAN	Constructed Of One inch Stainless Steel Tubing With Stainless Brackets Supports, 16 Gauge SS, 2" back splash Rounded Corners, All Edges, Turned Up 1 1/4", To be Used W/D-3-3.	
30	DISHWASHING MACHINE Commercial Stationary), Electric, (50 Racks Per Hour)	A	X		7320-01-028-3787	COMMERCIAL	Size 50-20, (20" X 20"), Racks, (Straight Feed), 50 Racks Per Hour (Notes: An Exception to Specification, (W/O Detergent Meter)	Electric, 208V, 60HZ, 3PH, 1HP, 50KW, Heating Element, 18KW Booster, 1/2" Inlet, 2" Drain
31	HOOD, Exhaust, Dishwasher, Condensate	A	X			BUILT TO ORDER AS PER PLAN	Used W/Item #30	
32	DISH TABLE, Clean, Stainless Steel W/Lower Storage Shelf	A	X		NNSN	BUILT TO ORDER AS PER PLAN	Used W/Item #30	NONE
33	SINK, Pot and Pan, Stainless Steel, 14 Gauge No 3 or 4 Finish, 3 Compartments, W/Drain Boards, ASTI 300 Series, W/Swing Faucets	A	X		NNSN	COMMERCIAL	W/Swing Faucets and Mechanical Lever Drains Sink Compartments Will be 30"W X 28" D X 16"H W/Adjustable Bullet Feet, W/9" Back splash, Covered Corners Single Faucet For Third Sink 180 Degrees Water	1/2" HW & CW 1 1/2" Drain
34	GARBAGE DISPOSAL MACHINE, Electric 5HP	A	X		NNSN	COMMERCIAL	5HP, Control Center, Circuit Breaker, Automatic Reversing, Positive Flush, 6-8" Diameter Throat Cut Out	Electric, 208V, 60HZ, 3PH, 1/2" CW, 2" Waste Drain

ARMY NATIONAL GUARD FOOD SERVICE EQUIPMENT SCHEDULES

ITEM NO.	ITEM DESCRIPTION	LOG Class	MILCON	OMARNG	NATIONAL STOCK NUMBER	SPECIFICATION COMMERCIAL	REMARKS	UTILITIES
35	SPRAY ASSEMBLY, Pre-rinse, Wall Mounted	A	X		NNSN	COMMERCIAL	W/Wall Bracket, (Horizontal Water Supply), Spray Unit, W/Water Mixing Control Valve, (7 1/4" To 8 1/4" on center), Self-Closing Spray Valve	1/2" HW & CW IPS Female Inlet
36	HEATER, Sink, Hot Water Booster, Electric Sanitizing	A	X		4520-01-041-2184	COMMERCIAL	9 KW, 180 Degree Hot Water Booster, For Final, Rinse Compartment Of the Pot and Pan Sink, Item #33	Electric, 208 V, 60HZ, 1PH, 9KW, 3/4" Inlet
37	HEATER, Hot Water, Booster Electric	A	X		4520-01-042-0409	COMMERCIAL	This item is designed, To Heat And Recirculate Only, Not to Heat the Water inside the Rinse Compartment.	Electric, 208V, 60HZ, 3PH 15KW
38	HOOD, Exhaust, Sink, Stainless Steel, SEE DETAIL DRAWING AND PLAN 5.07	A	X		MMSN	CUSTOM BUILT		Electric Motor
39	FLOOR TROUGH, W/Grate	A	X			COMMERCIAL		
40	SPRAY ASSEMBLY, Pre-rinse, Wall Mounted	A	X		NNSN	COMMERCIAL	W/Water Mixing Control Valve, (7 1/4" To 8 1/4" On Center) Self-Closing Spray Valve.	1/2" HW & CW IPS Female Inlet
41	HEATER, Hot water, Booster, Electric	A	X			COMMERCIAL	15KW, 180 Degrees Hot Water For The Dish washing Machine	208 V, 60HZ, 3PH 15KW

ITEM NUMBERS 42-44 NOT USED

KITCHEN, STORAGE, REFRIGERATION AREAS

45	KETTLE, Steam Jacketed, (Stainless Steel), 20 Gallon Electrically Heated	A	X		7310-00-355-8343	COMMERCIAL	(Floor Model), (20 Gallon Capacity), 3" Tangent Draw-Off Assembly	Electric, 208V, 60HZ, 3PH, 15KW, 1/2" Inlet
	OR							
	KETTLE, Steam Jacketed, (Stainless Steel) 20 Gallon Gas Heated	A	X			COMMERCIAL	(20 Gallon Capacity), Leg Mounted, W/3" Tangent Draw-Off Assembly, Hinged Cover Swing Spout, (Furnished To	Gas, 110,000 BTU, 115V, 60HZ, 1PH, 1/2" Inlet

ARMY NATIONAL GUARD FOOD SERVICE EQUIPMENT SCHEDULES

ITEM NO.	ITEM DESCRIPTION	LOG Class	MILCON	OMARNG	NATIONAL STOCK NUMBER	SPECIFICATION COMMERCIAL	REMARKS	UTILITIES
							Operate On Natural Gas), Quick Gas Disconnect Required	
46	PAN, Frying and Braising, Electric, Tilting Type, Stainless Steel, 7" Deep 30 Gallon Capacity	A	X		7310	COMMERCIAL	(W/O Extension Frames and Trays), (Non-Insulated Pan Side walls), (Floor Mounted), Size (40"L X 23"D X 7"H Pan Depth), (W/O Casters), With Tilting Mechanism, W/Hinged Cover, Terminal Block For Permanent Connect	Electric, 208V, 60HZ, 3PH, 15KW Drain Trough Required.
	OR							
	PAN, Frying and Braising, Gas Heated, Tilting Type Stainless Steel 7" Deep 30 Gallon Capacity	A	X		7310	COMMERCIAL	(W/O Extension Frames and Trays), (Non-Insulated Pan Side walls), (Floor Mounted), (40"L X 23"D X 7"H Pan Depth), (W/O Casters), With Tilting Mechanism, W/Hinged Cover, Burner Indicator Lights Are Required, (Furnished To Operate On Natural Gas), Quick Gas Disconnect is Req'd	Gas, 70,000 BTU, 115V, 60HZ, 1PH, Controls, Drain Trough Required
47	METERS, Water, Automatic, Industrial, Accuracy + - ½, Dispense 12 Gallons per minute	A	X		NNSN		With Hot and Cold Water Mixing Valve, Temperature Controls, Capacity, 70 LBS/Minute, W/Mounting Brackets, 100/200/400 LBS, W/Standard Dial Setting	Electric, 120V, 60HZ, 1PH, ½"HW & CW
	TYPICAL PRODUCER: Gemini Bakery Equipment, Model AMM Or Equal		X					
48	RANGE, Heavy Duty, Electric, Commercial, w/3 Hot Plates, (Hot Top)	A	X		7310-01-034-6169		W/Oven, (3 Hot Plates, (Minimum Size 12" X 24") Stainless steel Front and Sides, W/6" Legs (Adjustable)	Electric, 208V, 60HZ, 3PH, 24KW
	OR							
	RANGE, Heavy Duty, Gas, Commercial, Open Top, W/4	A	X		7310-00-823-7379	COMMERCIAL	W/Oven, W/4 Open Top Burners, Stainless Steel Front and sides	Gas, 162,000 115V, 60HZ, 1PH,

ARMY NATIONAL GUARD FOOD SERVICE EQUIPMENT SCHEDULES

ITEM NO.	ITEM DESCRIPTION	LOG Class	MILCON	OMARNG	NATIONAL STOCK NUMBER	SPECIFICATION COMMERCIAL	REMARKS	UTILITIES
	Open Burns						W/6" Legs (Adjustable), Furnished To Operate On Natural Gas	Controls
49	OVEN, Baking and Roasting (Stainless Steel) Forced Convection, Electric, 2 Compartments OR For Gas Oven See Item 49 On Small Food Service Kitchen Equipment Schedule	A	X		7310-00-353-5633	COMMERCIAL	(Two Oven Compartment), (Standard Oven Cavity), W/2 Speed Blower Motor Stainless Steel Interior, Stainless Steel exterior, Both Doors Will Have Heat Resisting Safety Viewing Glass	Electric, 208V, 60HZ, 3PH, 1 1/2 HP. 37KW
50	HOOD, Exhaust, W/Grease Automatic Wash down System, Stainless Steel, Fire Suppression System W/Clean Access Door For Clean Out	A	X		NNSN	COMMERCIAL	W/Vapor Proof Fluorescent Lights, W/Enclosed Panels (Ends Closed), W/Baffles, NFPA 13 & 96 (Fire Extinguishing System, Water or Dry Chemicals	Electric, Water
51	HOOD, Exhaust, Condensate, Stainless Steel	A	X		NNSN	COMMERCIAL	W/Vapor Fluorescent Lights, W/Enclosed Panels (End Closed)	Electric, Water
52	FLOOR THROUGH, W/Grate	A	X		NNSN	COMMERCIAL	Used W/Items # 45 & 46	NONE
53	SINK, Vegetable Preparation Stainless Steel No3 or 4 Finish, Covered Corners, ASTM Series W/SS Counter	A	X		NNSN	COMMERCIAL	2-Compartments, W/Drain Boards, W/Swing Faucets and Mechanical Lever Drain, Sink compartment Will Be 24"W X 28" X 14" H, With One 1/4" Wire Mesh Basket 20"W X 20"D X 12"H, Stainless Steel	1/2" CW & HW Swing Water Spouts, 1-1/2" Drain Line
54	GARBAGE DISPOSAL MACHINE, Electric, Commercial, 3HP	A	X		NNSN	COMMERCIAL	3HP, Control Center, Circuit Breaker Automatic Reversing, Positive Flush 6"-8" Diameter Throat Cut-Out.	Electric, 208V, 60HZ, 3PH, 3HP, 1/2" Water Inlet, 2" Waste Outlet
55	VEGETABLE PEELING MACHINE, Electric, 30 Pounds Capacity, W/Garbage Disposal (Optional)	A	X		7320	COMMERCIAL	(Floor-Mounted), 30 Pounds Of Potatoes, Per Charge) Complete W/Disposal, Waste & Disposal Stand Base, Stainless Steel Base, & Abrasive Or Ribbed Wall Cylinder	Electric, 115 V, 60HZ, LPH, 1 1/4" HP Disposal Motor) 1/2HP included 1/2" CW, 2 1/2" Drain
56	SHELF, Wall Mounted,	A	X		7310-NNSN	BUILT TO ORDER	Constructed of One Inch	

ARMY NATIONAL GUARD FOOD SERVICE EQUIPMENT SCHEDULES

ITEM NO.	ITEM DESCRIPTION	LOG Class	MILCON	OMARNG	NATIONAL STOCK NUMBER	SPECIFICATION COMMERCIAL	REMARKS	UTILITIES
	Stainless Steel					AS PER PLAN	Stainless Steel Tubing With Stainless Steel Brackets, Supports, 16 Gauge SS, 2" Back splash, Rounded Corners, All Edges Turned Up 1 1/2", To Be Used W/D-3-3	
57	ICE MAKING MACHINE, Cube Automatic Mechanical, Refrigerated, Self Contained Electric	A	X		4110	COMMERCIAL	(Air Cooled Condenser), 400 Pounds, Capacity, (Stainless Steel Cabinets, 300 Series Only)	Electric, 208V, 60HZ, 1PH, 2PH 1 1/2" drain line
58	SINK, Hand Lavatory, Stainless Steel, Typical Producer: SECO Products Model HS-11-2A ADVANCE MODEL 7-PS-32 METAL MASTER MODEL HSAJ-10-FL	A	X		MNSN	COMMERCIAL	No.3 or 4 Finish, Cited Dimensions, W/Soap/Towel Dispenser, Wrist Off/On Lever	1/2 HW & CW, 1 1/2" Drain
59	TABLE, Food Preparation, (Stainless Steel)	A	X		7320-00	COMMERCIAL	(Rolled Rim Top) (72" X 30" X 36") W/Under shelf, A (Stainless Steel Top, Frame & Fixed In Place W/Electric Outlets	Electric, 110V, 60HZ, 1PH
60	RACK, Table, Kitchen Utensils (Stainless Steel) For Mounting On Food Preparation Table, W/Sliding Hooks, Three Bars, Uprights, Table Mounted	A	X		7320-00-893-4728	COMMERCIAL	Detail Drawing 1.18 (Contractor will Provide) Use with Item 59	NONE
61	OPEN NUMBER							
62	TABLE, Food Preparation, Mobile, Stainless Steel, Rolled Rim Top	C		X	7320-00-008-7635	COMMERCIAL	(Rolled Rim Top,) (48" L X 30" W X 36" H) (With Under shelf), (Stainless Steel), (With Casters)	NONE
63	MIXING MACHINE, Food Electric (Vertical), (Commercial Type), 20 QT Capacity	C		X	2726	COMMERCIAL	Size 20 (20 W Bowl Capacity) Bench Mounted With Vegetable Cutting, Slicing Attachments	Electric, 120V, 60HZ, 1PH
64	STAND, Mixer, W/Attachment Meat Rack	C		X	7320	COMMERCIAL	For Use With 20 QT Mixer, W/Under shelf	

ARMY NATIONAL GUARD FOOD SERVICE EQUIPMENT SCHEDULES

ITEM NO.	ITEM DESCRIPTION	LOG Class	MILCON	OMARNG	NATIONAL STOCK NUMBER	SPECIFICATION COMMERCIAL	REMARKS	UTILITIES
65	OPENER, Can, Heavy Duty Electric	C		X	7330-00-272-2590	COMMERCIAL	Portable, W/Lid Lifter Use W/Item 59	Electric, 115V, 60HZ, 1PH
66	MEAT SLICING MACHINE, Automatic, Electric	C		X	7320-00-355-8389	COMMERCIAL	80 Slices Per Minute, Size 1, Bench Required.	Electric, 115V, 60HZ, 1PH, 1/3HP
67	FROZEN FOOD CABINET, Mechanically, Refrigerated, Stainless steel, 45 Cu Ft, Reach-in	A	X		4110-01-024-8990	COMMERCIAL	Reach-In 4 doors, Air Cooled Hermetically sealed condenser, with shelves	Electric, 208 V 60HZ, 3PH, 34HP
68	REFRIGERATOR, Prefabricated Mechanical cooled, Commercial Walk-in Dairy	A	X		MNSN	COMMERCIAL	Type I (Refrigerator) Style A (Flooders Design), Remote and Air Cooled Refrigeration system	Electric, 208V, 60HZ, 3PH,
69	REFRIGERATOR, Prefabricated Mechanically Cooled Commercial Walk in Vegetables	A	X		MNSN	COMMERCIAL	Type I (Refrigerator) Style A (Flooders Design), Remote and Air Cooled Refrigeration System	Electric, 120V, 60HZ, 3PH, 3HP
70	Doorway Closures, Plastic Strips Typical Procedures W. B McGuire Co, Inc Model SF 300 or Kelly Co Model 303 or equal	A 2	X		MNSN	COMMERCIAL	Transperant, Overlappinng Strip Rounded edge constructed Designed for low and Standard Temperature, (300X to 1500X F) Used W/R 2 Series Item (10A/ 10B/10C, Max Thickness .125 Inches	NONE
71	SHELVING, Stainless Steel Mobile, Food Service	C		X	7125	COMMERCIAL	Type II Style 1 (Mobile), (Wire Construction), W/5 Adjustable Shelves, W/5-Inch Casters, W/Bumper Guards	NONE
72	LOCKERS, Wall, Metal, Tier OR	A	X		7125-NNSN	COMMERCIAL	One Door, W/5 Shelves, W/Legs, To Be Used To Store, Containers of Condiments, Local Purchase and Authorized	
	SECURITY UNITS	A	X				Security Unit W/Casters	
73	TRUCK, Hand Shelf, Pot and Pan Rack, Stainless Steel	C		X	3920-00-171-9306	COMMERCIAL	(4 Shelves, 2 Fixed & 2 Adjustable), 800 Pounds Capacity, W/Bumpers & Casters	NONE

DG 415-5
01 JUNE 2011

ARMY NATIONAL GUARD FOOD SERVICE EQUIPMENT SCHEDULES

ITEM NO.	ITEM DESCRIPTION	LOG Class	MILCON	OMARNG	NATIONAL STOCK NUMBER	SPECIFICATION COMMERCIAL	REMARKS	UTILITIES
74	AIR CURTAIN FLY CONTROL MACHINE	A	X			COMMERCIAL	Air Velocity , Measured Three Feet Above The Floor Will Be 600 FPM For Personnel Entrance Ways, and Receiving Doors, Micro switch For Automatic, On/Off Air Curtains Must Cover Complete Width Of, The Door, Machine Must Be Installed Above The Exterior Of The Door.	Electric, 208V, 60 HZ, 1PH, 1/2HP

NOTES:

1. Point of Contact is as follows:

Army Center of Excellence Subsistence
U.S. Army Quartermaster Center and School
ATSM-CES-OE, 1201 22nd Street
Building P-5000
Fort Lee, VA 23801-1601
Tele. No. DSN 687-3450 Comm. (804) 734-3450
FAX. DSN 687-5108 Comm. (804) 734-5108
ATTN: Mr. Goldie M. Bailey

3. For Food Service Equipment Layout Sketch

See Design Guide (DG) 415-5, Appendix D,
Figure-1: Small Kitchen Equipment Layout.
Figure-2: Large Kitchen Equipment Layout

2. LOG CLASSIFICATIONS:

- A: Equipment authorized to be installed (i.e. attached to the floor and or permanently connected to the building structure or utility system) as part of the construction contract.
- C: Portable equipment which will be provided through supply channels and owner installed (and which should not be included in the construction contract) and for which no utility hook-ups are required (but which should be considered in the Space layout and operational plan).

4. FUNDING CLASSIFICATIONS:

MILCON: Military Construction
OMARNG: Operation & Maintenance Army National Guard

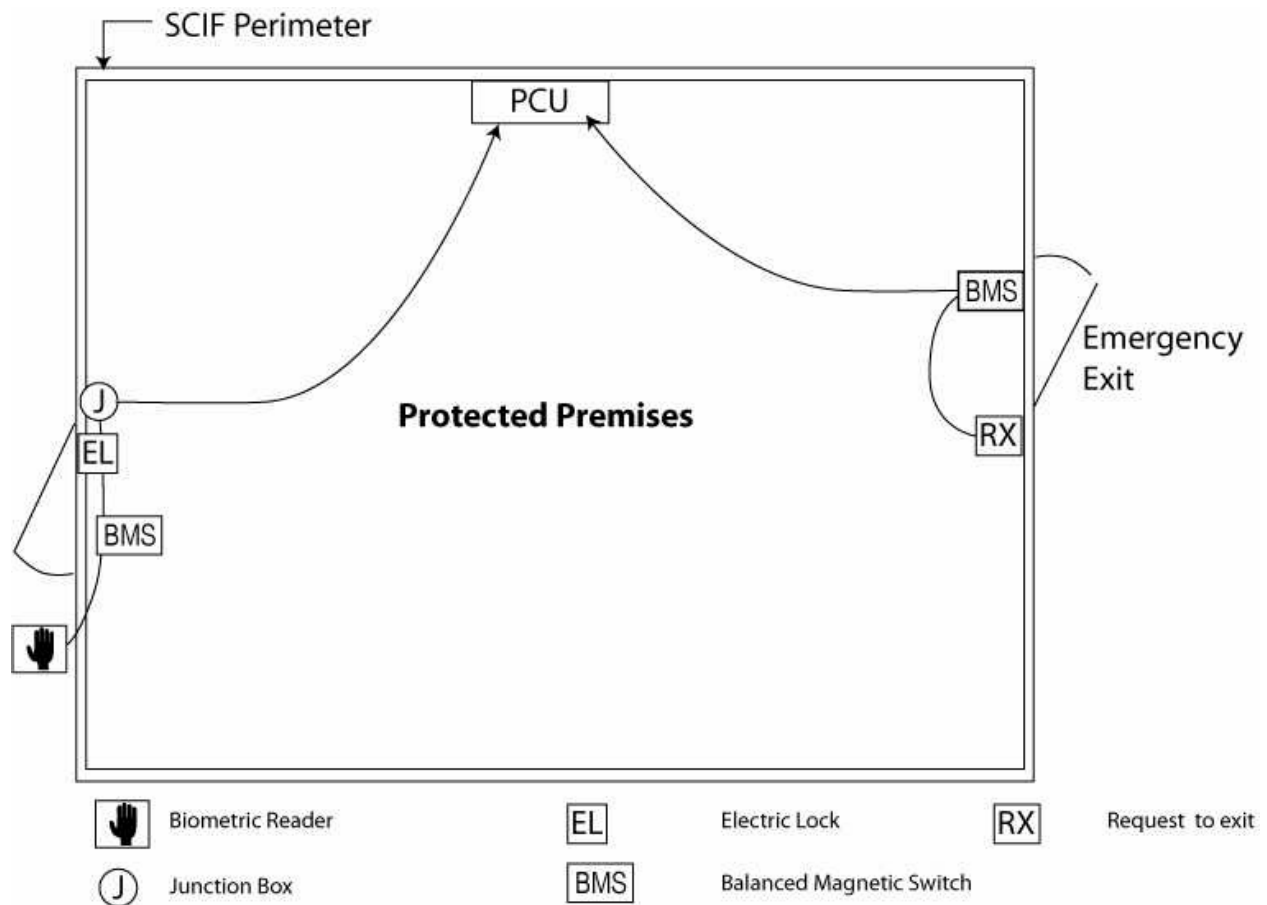


FIGURE 3 PCU IN A SCIF



MILCON Execution Slide Guide

<u>%DES (Design)</u>	<u>Design Bid Build D/B/B</u>	<u>Design Build D/B</u>
• 1% =	Design Release from DA	
• 2% =	1390 approved & Design Authority issued to State	
• 3% =	A/E Contract or RFP Awarded	
• 30% =	Concepts received by CFMO/NGB from the AE/State	1390/91, MCCA & Cost Validation
<u>Expected Submissions: Land-CT/License; NEPA-EBS; Rec/Check; EA; & EIS</u>		
• 35% =	Concepts approved by CFMO/NGB	
• 60% =	Prelims received by NGB from the State.....	Initial / Draft RFP
• 65% =	Prelims approved by NGB	
• 90% =	Finals received by NGB from the State.....	Pre-Final RFP
• 95% =	Finals approved by NGB	
• 100% =	Bid finals approved by NGB.....	Select Final Proposal (GMP)

AWARD CONSTRUCTION CONTRACT

AWARD SELECTED PROPOSAL

FORECAST - Expected Construction Award Date

<u>CURRENT YEAR</u>		<u>OUT YEARS</u>
• Green	- WILL AWARD in FY	Meeting Milestones
• Yellow	- Projected Award Date Beyond FY	<u>NOT</u> Meeting Milestones
• Red	- NO FORECAST – No Projected Award Date	

UNIFIED FACILITIES CRITERIA (UFC)

NON-EXPEDITIONARY BRIDGE INSPECTION, MAINTENANCE, AND REPAIR



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NON-EXPEDITIONARY BRIDGE INSPECTION, MAINTENANCE, AND REPAIR

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U.S. ARMY CORPS OF ENGINEERS

NAVAL FACILITIES ENGINEERING COMMAND

AIR FORCE CIVIL ENGINEER CENTER (Preparing Activity)

Record of Changes (changes are indicated by \1\ ... /1/)

Change No.	Date	Location

This UFC supersedes UFC 3-310-08, *Non-Expeditionary Bridge Inspection, Maintenance, and Repair*, dated 16 August 2010.

FOREWORD

The Unified Facilities Criteria (UFC) system is prescribed by MIL-STD 3007 and provides planning, design, construction, sustainment, restoration, and modernization criteria, and applies to the Military Departments, the Defense Agencies, and DOD Field Activities in accordance with [USD \(AT&L\) Memorandum](#) dated 29 May 2002. UFC will be used for all DOD projects and work for other customers where appropriate. All construction outside of the United States is also governed by Status of Forces Agreements (SOFA), Host Nation Funded Construction Agreements (HNFA), and, in some instances, Bilateral Infrastructure Agreements (BIA). Therefore, the acquisition team must ensure compliance with the more stringent of the UFC, the SOFA, the HNFA, and the BIA, as applicable.

UFC are living documents and will be periodically reviewed, updated, and made available to users as part of the Services' responsibility for providing technical criteria for military construction. Headquarters, U.S. Army Corps of Engineers (HQUSACE), Naval Facilities Engineering Command (NAVFAC), and the Air Force Civil Engineer Center (AFCEC) are responsible for administration of the UFC system. Military Departments, the Defense Agencies, and DOD Field Activities should contact the preparing Service for document interpretation and improvements. Technical content of UFC is the responsibility of the cognizant DOD working group. Recommended changes with supporting rationale should be sent to the respective Service proponent office by the following electronic form: [Criteria Change Request](#). The form is also accessible from the Internet site listed below.

- UFC are effective upon issuance and are distributed only in electronic media from the following source: Whole Building Design Guide web site <http://dod.wbdg.org/>.

Refer to UFC 1-200-01, *DoD Building Code (General Building Requirements)*, for implementation of new issuances on projects.

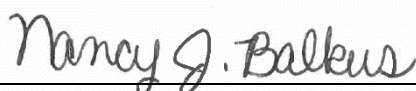
AUTHORIZED BY:



LARRY D. McCALLISTER, PhD, PE,
PMP, SES
Chief, Engineering and Construction
Directorate of Civil Works
U.S. Army Corps of Engineers



JOSEPH E. GOTT, P.E.
Chief Engineer
Naval Facilities Engineering Command



NANCY J. BALKUS, P.E., SES, DAF
Deputy Director of Civil Engineers
DCS Logistics, Engineering and
Force Protection (HAF/A4C)
HQ, United States Air Force



MICHAEL McANDREW
Deputy Assistant Secretary of Defense
(Facilities Investment and Management)
Office of the Assistant Secretary of Defense
(Energy, Installations, and Environment)

**UNIFIED FACILITIES CRITERIA (UFC)
REVISION SUMMARY SHEET**

Document: UFC 3-310-08, *Non-Expeditionary Bridge Inspection, Maintenance, and Repair*

Superseding: UFC 3-310-08, *Non-Expeditionary Bridge Inspection, Maintenance, and Repair*, dated 16 August 2010

Description: This document provides guidance to ensure military garrison/base bridges remain safely in operation and behave reliably for civilian and military traffic.

Reasons for Document:

- **Purpose:** To ensure that military installation bridges remain safely in operation and perform reliably for civilian and military traffic. The bridges inspected, operated, and maintained by military agencies should meet or exceed the same standards to which bridges under U.S. civilian jurisdiction are subject.
- **Application:** This UFC provides direction so all military installation bridges are appropriately inspected and the results reported in accordance with current federal standards, Federal Highway Administration (FHWA) criteria, and Federal Railway Administration (FRA) criteria. This UFC also provides direction to ensure all military installation bridges are maintained and repaired in a consistent manner and in accordance with industry standards.

Impact:

The publication of UFC 3-310-08 will not result in any increased cost to the Services. Each Service is already in compliance with the National Bridge Inspection Standards (NBIS) and the reporting requirements directed by the Code of Federal Regulations, Title 23, Part 650, Subpart C, and Title 49, Subtitle B, Chapter II, Part 237. The provisions in this UFC are already being accomplished by each Service as directed by separate Service documents (Army ER 1110-2111, Air Force ETL 07-5 [superseded by this UFC], and Navy UG-60020-OCN).

Unification Issues:

Not applicable; all agencies affected by this UFC are subject to the same requirements.

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CHAPTER 1 INTRODUCTION

1-1 BACKGROUND.

In an effort to develop a coherent and consistent Department of Defense (DOD) policy for the inspection, evaluation, maintenance, and repair of installation bridges, this UFC was created to consolidate evolving federal bridge inspection and industry standards. As federal and state regulations, standards, guidelines, and procedures continually change, it is critical to remain current with the industry and update this UFC to ensure compliance with all bridge inspection, evaluation, load rating, maintenance, and repair requirements.

1-2 PURPOSE.

This UFC defines requirements for inspection, maintenance, and repair of bridges on military installations in accordance with current federal and industry standards. In particular, highway bridges must conform to Federal Highway Administration (FHWA) criteria (23 CFR 650 Subpart C) while railroad bridges must conform to Federal Railroad Administration (FRA) criteria (49 CFR 237). The purpose of these requirements is to ensure military installation bridges can safely and reliably carry civilian and military traffic. All bridges inspected, operated, and maintained by military agencies should meet or exceed the same standards to which bridges under U.S. civilian jurisdiction are subject.

1-3 SCOPE.

This UFC applies to all military installation bridges, whether located in the contiguous United States (CONUS) or outside the contiguous United States (OCONUS), including Alaska, Hawaii, U.S. territories and possessions, and foreign territories. Installation bridges can be classified according to the type of traffic “over” the bridge as 1) highway bridges, 2) railroad bridges, 3) pedestrian bridges, 4) golf cart bridges, or 5) taxiway bridges. This UFC does not apply to expeditionary bridges located in military theaters of operation. This UFC does not apply to Army Corps of Engineers civil works bridges located outside of an installation.

1-4 REFERENCES.

Appendix A contains a list of references used in this UFC.

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CHAPTER 2 DOD BRIDGE INSPECTION AND MANAGEMENT PROGRAM

This chapter provides technical requirements for a bridge inspection and management program. Refer to the appropriate sections in this UFC for inspection, load rating, reporting, maintenance, and repair requirements for each type of bridge.

2-1 ORGANIZATIONAL STRUCTURE – RESPONSIBILITIES AND QUALIFICATIONS.

The U.S. Code of Federal Regulations (23 CFR 650.305 and 49 CFR 237) requires each Military Department to establish and maintain a bridge inspection and management program. At the head of each program is a National Bridge Program Manager who enforces the bridge program in accordance with the Military Department's policies.

Point of contact information for each Military Department's bridge program is found in Appendix B, paragraph B-3.

The credentials, qualifications, and responsibilities of the key bridge program positions are described below. The fulfillment of these duties can be accomplished using in-house personnel, contracted personnel, or personnel from another government agency.

2-1.1 National Bridge Program Manager.

The National Bridge Program Manager for each Military Department provides overall leadership and inspection guidance for every bridge in the Department's bridge inventory (CONUS and OCONUS). The National Bridge Program Manager must successfully complete an FHWA-approved comprehensive bridge inspection training course followed by an FHWA-approved refresher training course every subsequent five years. Also, the National Bridge Program Manager must either be a licensed professional engineer (P.E.) or have 10 years of bridge inspection experience. The National Bridge Program Manager should have a general understanding of all aspects of bridge engineering, including design, load rating, new construction, rehabilitation, inspection or condition evaluation, and maintenance.

Refer to Appendix B, paragraph B-10, Table B-4, for delineation of responsibilities between the National Bridge Program Manager and Installation Bridge Managers for each Military Department.

2-1.2 Installation Bridge Manager.

An Installation Bridge Manager typically carries out responsibilities delegated from the National Bridge Program Manager at a specific military installation as delineated in Appendix B, paragraph B-10, Table B-4. The Installation Bridge Manager must have completed an FHWA-approved comprehensive bridge inspection training course and must complete an FHWA-approved refresher training course every five years after completing the FHWA-approved comprehensive training course.

2-1.3 Load Rating Engineer.

As required by 23 CFR 650.309(c), each Military Department must designate a Load Rating Engineer who will be responsible for ensuring load ratings are performed as specified in this UFC. The individual responsible for load rating calculations or determining a load rating by engineering judgment must be a P.E.

For railroad bridges falling under the jurisdiction of the FRA bridge safety standards, 49 CFR 237, the Load Rating Engineer must also meet the requirements of 49 CFR 237.51 and be designated as a Railroad Bridge Engineer.

2-1.4 Railroad Bridge Engineer.

Railroad bridge inspection, maintenance, and load rating functions must be performed under the direction of a Railroad Bridge Engineer. A Railroad Bridge Engineer is a person determined by the track owner to be competent to perform the functions identified in 49 CFR 237.51(a). These functions include determining forces and stresses in railroad bridges and bridge components, prescribing safe loading conditions for railroad bridges, prescribing inspection and maintenance procedures for railroad bridges, and designing repairs and modifications to railroad bridges.

A Railroad Bridge Engineer must meet the educational qualifications as specified in 49 CFR 237.51(b), including either an engineering degree from an accredited program or current registration as a P.E.

2-1.5 Railroad Bridge Inspector.

A Railroad Bridge Inspector must meet the requirements specified in 49 CFR 237.53.

2-1.6 Inspection Team Leader (Highway Bridges).

The Inspection Team Leader must meet the requirements specified in 23 CFR 650.305. Inspection Team Leaders must complete an FHWA-approved refresher training course every five years after completing the FHWA-approved comprehensive training course.

2-1.7 Underwater Bridge Inspector.

The underwater bridge inspection diver must have a commercial diver certification. Diver training certification must conform to Section 30.A.06 of Army Engineering Manual (EM) 385-1-1, *Safety and Health Requirements*. An underwater bridge inspection diver who does not meet the qualifications of paragraph 2-1.6 must have completed an FHWA-approved comprehensive bridge inspection training course or other FHWA-approved underwater bridge inspection training course. Underwater Bridge Inspection Team Leader requirements are the same as those listed in paragraph 2-1.6. All underwater inspections will be under the direct supervision of a qualified Inspection Team Leader with underwater inspection experience.

Underwater inspector qualifications must meet host country underwater diver qualifications in addition to the requirements of the National Bridge Inspection Standards (NBIS) and with the approval of the National Bridge Program Manager.

2-1.8 Hydraulic Bridge Engineer.

Hydraulic Bridge Engineers performing scour calculations must be licensed P.E.s and have relevant work experience in bridge hydraulic modeling and scour evaluations.

2-2 BRIDGE INVENTORY DATA REQUIREMENTS.

2-2.1 Components of Bridge File.

Complete, accurate, and current bridge records must be maintained in a bridge file for each National Bridge Inventory (NBI) highway bridge in accordance with AASHTO MBE-2-M, *The Manual for Bridge Evaluation*, Section 2. It is recommended that bridge files for all other bridges follow this format. The bridge file provides a full history of the structure, including construction drawings, as-built drawings, photographs, damage, repairs, and capacity calculations. At a minimum, significant bridge file components that must be maintained include:

- Inspection reports
- Waterway information (channel cross-sections, soundings, stream profiles)
- Significant correspondence
- Special inspection procedures or requirements
- Load rating documentation, including load testing results
- Posting documentation
- Critical findings and actions taken
- Scour assessment
- Scour plan of action (POA) for scour critical bridges and those with unknown foundations and documentation of post-event inspection or follow-up
- Inventory and evaluation data and collection/verification forms.

Refer to Section 2 of AASHTO MBE-2-M, *The Manual for Bridge Evaluation*; 49 CFR 237.33; and FHWA-PD-96-001, *Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges*, for additional information regarding bridge files.

2-2.2 File Retention/Data Storage.

File retention and organization policies will be determined by the National Bridge Program Manager. Each Military Department's National Bridge Program Manager will determine the storage location in accordance with Section 2 of AASHTO MBE-2-M.

Bridge files must be readily accessible to the Installation Bridge Manager. It is highly recommended that hard copies of inspection reports and load ratings be maintained for two full inspection cycles (typically 48 months). Electronic copies of components of the bridge file, inspection reports, and load ratings will be maintained in perpetuity, along with bridge inventory database information. If components of the bridge file are found to be deficient or incomplete, a plan of corrective action will be developed to remedy future recordkeeping procedures.

2-3 QUALITY CONTROL/QUALITY ASSURANCE REQUIREMENTS.

The National Bridge Program Manager will determine the specific procedures for quality control (QC) and quality assurance (QA) reviews. At a minimum, 5 percent of bridge inspection teams and 5 percent of the inspected bridges will be audited annually in some manner (e.g., through field reviews of inspection teams or office reviews of inspection reports). FHWA *Bridge Inspector's Reference Manual* (BIRM), Topic 1.3.4, discusses the FHWA-recommended QC/QA framework.

As part of the QC/QA framework, the bridge management program will identify QC and QA responsibilities.

Once established, QC/QA procedures for each agency must be compiled in a manual that is readily available to all personnel involved with bridge inspection; this manual will be updated to reflect any procedural changes.

CHAPTER 3 HIGHWAY BRIDGES

3-1 DEFINITIONS.

3-1.1 Highway.

A “highway” is defined by 23 U.S.C. 101(a)(11) as follows:

(11) Highway. - The term "highway" includes –

(A) a road, street, and parkway;

(B) a right-of-way, bridge, railroad-highway crossing, tunnel, drainage structure including public roads on dams, sign, guardrail, and protective structure, in connection with a highway.

Therefore, all roads on military installations are considered to be “highways.”

3-1.2 Public Road.

A “public road” is defined by 23 U.S.C. 101(a)(21) as follows:

(21) Public road. - The term "public road" means any road or street under the jurisdiction of and maintained by a public authority and open to public travel.

Since roads on military installations are typically accessible to military personnel, government civilians, contractor personnel, and retired personnel, all road bridges on military installations are deemed to be public highway bridges regardless of the bridge’s access restrictions unless the Installation Commander designates otherwise (with the Military Department’s National Bridge Program Manager’s approval). Non-public designations will be avoided unless warranted by special circumstances.

3-1.3 Bridge.

A “bridge” is defined in 23 CFR 650.305 as follows:

“A structure including supports erected over a depression or an obstruction, such as water, highway, or railway, and having a track or passageway for carrying traffic or other moving loads, and having an opening measured along the center of the roadway of more than 20 feet (6.1 meters) between undercopings of abutments or spring lines of arches, or extreme ends of openings for multiple boxes; it may also include multiple pipes, where the clear distance between openings is less than half of the smaller contiguous opening.”

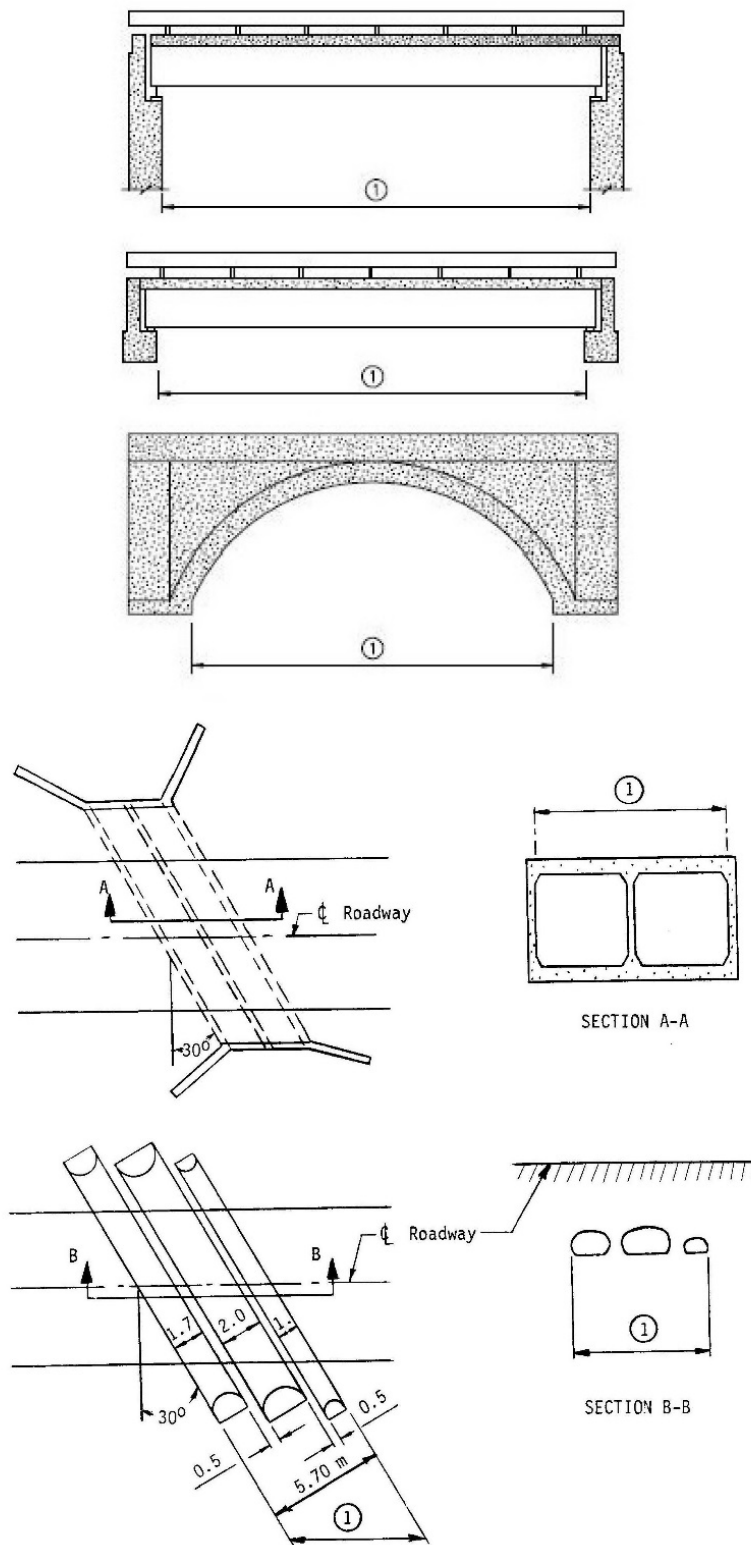
The method to measure bridge length is depicted in Figure 3-1 as taken from FHWA-PD-96-001.

The NBIS apply to installation highway bridges (in U.S. states and territories) that meet the length requirement above. Highway bridges that meet the length requirements

specified in the NBIS are required to be included in the NBI. Requirements for installation bridges in foreign territories have similar requirements, as described in paragraph 3-3.2.

Culverts also qualify as bridges if the preceding definition applies. Culverts that do not meet the preceding definition may be managed similarly to other installation drainage structures.

Figure 3-1 NBIS Bridge Length



① Item 112 ~ NBIS Bridge Length

3-1.4 Strategic Highway Corridor Network (STRAHNET)

FHWA-PD-96-001 defines the Strategic Highway Corridor Network (STRAHNET) and connectors as a system of highways that are strategically important to the defense of the United States. There are no STRAHNET highways or connectors carried by bridges on military installations. For situations where an installation owns a bridge over a STRAHNET highway or connector, refer to the description of item 5A in FHWA-PD-96-001 for coding instructions.

3-2 NATIONAL BRIDGE INVENTORY (NBI) HIGHWAY BRIDGES.

All NBI highway bridges must be inspected in accordance with the NBIS. These standards establish minimum federal requirements for inspection procedures, inspection intervals, personnel qualifications, inspection reports, and bridge inventory records. Although not reproduced verbatim in this UFC, the standards are listed in Appendix A as a reference. The NBIS should be consulted whenever a question arises regarding federal inspection requirements.

The FHWA has developed 23 metrics for the oversight of the National Bridge Inspection Program. Agencies and installations must take the necessary steps to remain compliant with the NBIS as determined by FHWA and the 23 metrics. Refer to FHWA *Metrics for the Oversight of the National Bridge Inspection Program* for additional information.

3-2.1 History of the NBIS Program.

Several catastrophic bridge failures since 1967 have led to the creation of and modifications to federal laws that constitute the FHWA-managed NBIS. The NBIS provides requirements for inspecting highway bridges and reporting bridge conditions annually in the NBI database. The procedures to implement the NBIS requirements are explained in the BIRM. For a more comprehensive history of the National Bridge Inspection Program, refer to the BIRM, Chapter 1.

3-2.2 Bridge Inspection Requirements.

3-2.2.1 Inspection Types and Interval.

Bridge inspections are conducted to determine the physical condition of the structure, to develop the basis for load rating analyses, to assess the need for maintenance, and to track the functional condition and rate of deterioration over time. There are seven inspection types requiring unique levels of effort: initial/inventory, routine, damage, in-depth, fracture critical, underwater, and special.

Descriptions of and the required inspection intervals for each type of inspection are specified below. The inspection intervals may be altered but must meet all applicable NBIS criteria. See Appendix B, paragraph B-2, for inspection interval alteration procedures. Late inspections require a justification of unusual circumstances (e.g., natural disaster, ongoing bridge construction activity) and will be included in the bridge file.

3-2.2.1.1 Initial/Inventory Inspection.

The initial/inventory inspection is the first inspection after a bridge is built or added to the installation real property and becomes a part of the bridge file. Elements of the initial/inventory inspection will also apply when there has been a change in configuration of the structure (e.g., widening, lengthening, and supplemental bents). It is important for the inspectors to identify any existing problems or locations in the structure where potential problems may arise. An initial inspection must provide all Structure Inventory and Appraisal (SI&A) data. A thorough review of as-built plans will be conducted prior to the initial inspection and the inspector will note any fracture critical members (FCM) or details during this inspection. A Level 1 scour screening is required if the bridge crosses over a waterway. A revised or new load rating may be required with the initial inspection if the rating was not part of the construction submittal or if repairs affected the structural capacity. The initial/inventory inspection documents the baseline condition assessment of the bridge.

Initial/inventory inspections must be performed **within 90 days** of the bridge opening to traffic. New bridges must be added to the installation real property and become a part of the bridge file prior to opening to traffic.

3-2.2.1.2 Routine Inspection.

Routine inspections are regularly scheduled inspections serving to collect observations and measurements of any changes from the initial inspection or any previously conducted inspection. The routine inspection must be performed and reported in accordance with NBIS requirements.

All routine inspections will be conducted at regular intervals **not to exceed 24 months**. The National Bridge Program Manager may increase routine inspection intervals for bridges that meet the criteria for increased inspection intervals discussed in Appendix B, paragraph B-2.

3-2.2.1.3 Damage Inspection.

Damage inspections are one-time unscheduled inspections performed after environmental events or human actions such as collisions, floods, or earthquakes. Damage inspections are performed to 1) determine if structural damage has occurred, 2) evaluate the extent of any structural damage, and 3) determine the level of effort for required repairs.

Damage inspections must be performed within a reasonable time after a natural disaster or human-caused action. The inspectors must document all damaged members, measuring, at a minimum, any section loss, member misalignment, and any loss of foundation support. The inspection must provide all of the information necessary to determine if bridge closure is required or to perform an emergency load restriction.

Local installation personnel may make an initial assessment of the bridge if personnel meeting required inspector qualifications are not immediately available. The results of the initial damage assessment will be forwarded to the Installation Bridge Manager for

review. Based on the information in the initial damage assessment, the Installation Bridge Manager will determine if additional resources (e.g., additional inspection, testing, load rating, design) are required to fully evaluate or correct the damaged condition. The Installation Bridge Manager or National Bridge Program Manager may recommend a follow-up in-depth inspection of the bridge to monitor the structure.

3-2.2.1.4 In-Depth Inspection.

In-depth inspections are hands-on, close-up inspections of one or more members above or below the waterline. In-depth inspections are more detailed and may require special access techniques to inspect areas not easily detectable in a routine inspection.

In-depth inspections are required every 24 months for fracture critical bridges. For other bridge types, in-depth inspections may be performed after damage or other special inspections are performed, at the direction of the Installation Bridge Manager or National Bridge Program Manager. For small bridges, the in-depth inspection includes inspection of all critical members of the structure. For large and complex structures, these inspections may be scheduled separately for defined segments of the bridge or bridge elements, connections, or details.

3-2.2.1.5 Fracture Critical Inspection.

Fracture critical inspections are detailed, hands-on inspections of steel bridges with FCMs that may include visual or other nondestructive evaluations. Prior to inspection, a thorough review of the design or as-built plans, fracture-critical inspection plan, previous inspection reports, load rating, and fatigue-prone details must be made. In the absence of plans or identification of fatigue-prone details, the inspector should be able to determine the fatigue-prone details based on the information provided in Table 6.6.1.2.3-1 of AASHTO LRFDUS-7, *LRFD Bridge Design Specifications*. FCMs require a “hands-on” inspection, where the inspector is capable of touching the area being inspected (arm’s length). Physical inspection methods may be necessary to more accurately assess the condition of an FCM. Advanced inspection methods may need to be employed, including nondestructive testing (NDT) methods. The hands-on inspection should identify and note the condition of problematic details prone to crack development.

For more information regarding inspection techniques for fracture critical bridges, refer to the BIRM or FHWA-NHI-11-015, *Fracture Critical Inspection Techniques for Steel Bridges Participant Workbook*. For additional information and case studies on fatigue damage in welded, bolted, and riveted structures, refer to FHWA *Manual for Inspecting Bridges for Fatigue Damage Conditions* and John W. Fisher’s *Fatigue and Fracture in Steel Bridges – Case Studies*.

Fracture critical inspections will be conducted at regular intervals not to exceed 24 months. In order to establish the criteria for fracture critical inspection intervals and level of effort, factors such as bridge age, fatigue-prone details, and known deficiencies will be considered.

3-2.2.1.6 Underwater Inspection.

3-2.2.1.6.1 Underwater inspections include diving to visually inspect and measure bridge components, probing for scour or undermining, and sounding to locate the bottom of the channel. The inspection must include such methods as necessary to adequately perform a condition assessment of the structure. If a bridge can be adequately inspected by wading, shallow probing, or with the use of cameras at low water conditions, a formal underwater inspection (divers) is not required. For bridges that do not require a formal underwater inspection, Item 93B on the SI&A form will not be coded. The Installation Bridge Manager will ensure inspections occur at low water conditions while maintaining compliance with the required bridge inspection schedule.

3-2.2.1.6.2 According to the BIRM, there are three levels of underwater inspection intensity:

- Level 1 – Visual, tactile inspection
- Level 2 – Detailed inspection with partial cleaning
- Level 3 – Highly detailed inspection with NDT or partially destructive testing (PDT)

3-2.2.1.6.3 Bridge inspectors must examine previous inspection reports or gather sufficient bridge and channel information to determine which level of underwater inspection is required when contracted or tasked to perform underwater inspections for specific bridges.

3-2.2.1.6.4 Level 1 inspections are required for all routine underwater inspections and will be performed within arm's reach of the areas being inspected. Visual inspections are performed across the entire submerged structure, but, in areas of poor water clarity, a tactile sweeping motion of the hands and arms may be used to inspect the entire substructure.

3-2.2.1.6.5 Level 2 inspections include cleaning off marine or aquatic growth at critical inspection areas and inspecting high-stress, damaged, and deteriorated areas that may be shielded by the growth. Critical areas near the low waterline, mudline, and midway between will be inspected. Piers and abutments will have at least 1 square foot (0.09 square meter) cleaned at three or more levels on each face. For structures greater than 50 feet (15.2 meters) in length, an additional three levels will be cleaned at each exposed face. For piles, horizontal bands a minimum of 10 inches (254 millimeters) long will be cleaned along the following locations:

- Rectangular – At least three sides
- Octagonal – At least six sides
- Round – At least 75 percent of circumference
- H-pile – At least the outside faces of flanges and one side of web

3-2.2.1.6.6 Level 2 inspection is recommended for 10 percent of all underwater elements.

3-2.2.1.6.7 Level 3 inspections include the complete cleaning of a structural element and NDT or PDT. Detailed measurements will be made along with testing techniques such as ultrasonic, physical material sampling, or boring. These inspections are generally performed when a structural repair or possible replacement is being considered.

3-2.2.1.6.8 Level 3 inspections are recommended for members that require repair or rehabilitation.

3-2.2.1.6.9 For additional information, it may be helpful to review FHWA-NHI-10-027, *Underwater Bridge Inspection*. This report contains valuable information on underwater inspection techniques, underwater repair techniques, and scour issues.

3-2.2.1.6.10 Underwater inspections must be completed at regular intervals not to exceed 60 months. The Installation Bridge Manager may decrease the interval of underwater inspections based on Level 1 or Level 2 scour evaluations, evidence of substructure movement, stream migration, bank sloughing, or debris buildup. Any deviation in the underwater inspection interval must be documented in the bridge file. FHWA-NHI-10-027 provides guidance for alterations to underwater inspection intervals.

3-2.2.1.7 Special Inspection.

Special inspections monitor a known member deficiency or other conditions that warrant special attention, such as foundation settlement or scour, fatigue damage, severe section loss, critical findings, or the public's use of a load posted bridge. These inspections are not usually comprehensive enough to meet NBIS requirements for routine inspections.

Based on the recommendations in the inspection reports, the Installation Bridge Manager will determine when special inspections are required. Special inspections are scheduled based on the severity of the deficiency/condition being monitored and the anticipated rate of continued deterioration (i.e., special inspections for scour should be performed after high-water events; special inspections for section loss should be at three-, six-, or twelve-month intervals, based on the severity of deterioration and its effect on the bridge's safe load capacity).

For bridges that do not require a formal special inspection, Items 92C and 93C on the SI&A form will not be coded. For bridges where items 92C and 93C are coded, a separate report for this inspection is required. If the inspection is conducted in conjunction with other inspections, the scope, procedures, findings, and recommendations must be recorded in a separate paragraph in the bridge inspection report.

3-2.2.2 Inspection Procedures.

Each bridge must be inspected in accordance with 23 CFR 650. Guidance on various bridge inspection procedures is provided in the BIRM and AASHTO MBE-2-M. A minimum of one qualified team leader must be present at all times during initial, routine, in-depth, FCM, and underwater inspections.

3-2.3 Load Rating and Posting Requirements.

For new bridge design, load rating calculations must be a contract deliverable. Load ratings will be performed during all initial inspections or when no previous load rating exists. During routine, in-depth, fracture critical, underwater, or special inspections, any changed conditions identified that may alter the load rating will be forwarded to the Load Rating Engineer for review. If damage, deterioration, or structure alterations noted during the inspection are determined by the Load Rating Engineer to be significant, an updated load rating will be performed and load restriction may be required.

The load rating report must clearly state basic information about the bridge (e.g., configuration, material type, age), method of analysis, references, and all assumptions used to establish a valid load rating.

3-2.3.1 AASHTO Load Ratings.

Load rating must be performed for all roadway bridges that meet the NBIS definition of a bridge (over 20 feet [6.1 meters] measured along the centerline of the roadway). The load rating must be calculated in accordance with AASHTO MBE-2-M. For highway bridges on an installation in foreign territory, if the foreign country's bridge code is more stringent than AASHTO, the foreign bridge code will govern the load rating. Posting of bridges (including the specific sign) for civilian vehicles, when determined to be necessary from the load rating, will be in accordance with local requirements (typically, state legal load limits or the foreign code legal load limits); see Appendix B, paragraph B-4, for state posting loads. Highway bridges must have load ratings for special hauling vehicles (SHV) per FHWA's *Load Rating of Specialized Hauling Vehicles* Memorandum. All NBI bridges must have valid load rating calculations in the bridge file.

3-2.3.2 Military Load Classification (MLC) Load Ratings.

All installation highways that have or will have military tactical vehicles traveling on them must have military load classification (MLC) load ratings on file for the bridges. The MLC is determined using the procedures in AASHTO MBE-2-M, with the live loads shown in Appendix B, paragraph B-1. MLC methods in Army Field Manuals and Training Aids are not permitted. Appropriate MLC signs must be placed at both ends of the bridge; this must be done for all vehicular bridges requiring a load rating (i.e., all roadway bridges over 20 feet [6.1 meters] long). If an installation or roadway is deemed as "administrative" only, with no military vehicle usage, the Installation Bridge Manager may waive, at the approval of the National Bridge Program Manager, the MLC load rating requirement for the bridge. Posting of "No Tactical Vehicles on Bridge" may be required. Additionally, MLC is determined for military tactical vehicle use of the bridge only; it is not considered part of the load rating information submitted to FHWA.

3-2.3.3 Limited Information Bridges.

Bridges with limited as-built information (i.e., no design drawings or calculations) must be rated based on as-inspected field measurements and/or the procedures in Section 6.1.4 of AASHTO MBE-2-M. When material sampling from the structure is not possible, refer to the current version of AASHTO MBE-2-M for material specifications based on the approximate year of construction. The load rating report must clearly state basic information about the bridge (e.g., configuration, material type, age), method of analysis, references, and all assumptions used to establish a valid load rating. In the absence of previous design, as-built, or shop drawings, it is recommended to field-measure all member dimensions necessary to establish as-built properties for the load rating analysis.

Inventory and operating level ratings may be assigned based on design loading, given the bridge meets the requirements of the FHWA memorandum, *Action: Assigned Load Ratings*, dated September 29, 2011.

3-2.3.4 Load Posting of Bridges.

Bridges where the load rating determines that the safe load-carrying capacity is below statutory (most often the state or host nation) levels will be posted for a load restriction. The maximum safe load, as determined by the load rating, must be posted using signage in accordance with the FHWA *Manual on Uniform Traffic Control Devices for Streets and Highways* (MUTCD) R12 series signs or local requirements.

Installations will install load posting signs as soon as possible—no later than 90 days after notification that posting is required. In cases where known existing loads significantly exceed the recommended posting limit or the route is of significant importance (e.g., bus routes, emergency vehicle routes), posting more quickly is important to ensure safety.

Load posting signs must be placed at the bridge for each direction of travel, as well as a minimum of 0.25 mile (0.4 kilometer) in advance of the bridge, or at the location of the nearest intersection prior to the bridge, for each direction of travel.

3-2.4 Bridge Inventory Data Requirements.

All bridge records must be maintained by the installation, including the inspection reports, plans, and follow-up actions taken to address deficiencies identified during inspections. Findings will be recorded on standardized agency forms. Complex bridges and bridges with FCMs, underwater elements, or scour critical status must be identified and given special attention according to the appropriate procedures.

An inventory of all bridges must be maintained by the Military Department with jurisdiction over those bridges. Reporting of inspection data will be per each individual agency's policy and FHWA-PD-96-001 (and FHWA-PD-96-001's most current Errata Sheet). Inspection data, including inventory and appraisal data (SI&A data), will be collected and maintained for all bridges that are inspected. Refer to Appendix B, paragraph B-5, for a bridge inspection reporting flowchart.

SI&A data will be entered into the agency's inventory within 90 days of the date of updating, change, or editing.

3-2.5 Deficiencies and Critical Findings.

The Installation Bridge Manager is responsible for ensuring all deficiencies identified in bridge inspection reports are addressed as soon as possible. Maintenance issues and minor repairs can be addressed immediately using in-house resources. Other deficiencies require projects to be programmed following Military Department-specific procedures. The Installation Bridge Manager is responsible for programming and providing advocacy for projects addressing identified bridge deficiencies. The Installation Bridge Manager must ensure that critical findings are addressed in accordance with the procedures described in paragraph 7-1. The Installation Bridge Manager will maintain supporting documents showing the actions taken to address all deficiencies identified in the bridge inspection reports.

3-3 NON-NBI HIGHWAY BRIDGES.

Highway bridges in foreign territories and all other highway bridges that do not meet the span length or public road requirements of the NBIS are not included in the NBI and are referred to as "Non-NBI Highway Bridges." The requirements for these bridges are described in the following paragraphs.

3-3.1 Short Span and Non-Public Highway Bridges.

3-3.1.1 Inspection Requirements.

Highway bridges that do not meet the NBIS span length and/or public road requirements must be inspected at a frequency interval of not greater than 48 months.

The National Bridge Program Manager can approve the exemption of short span bridges from the inspection requirement if engineering judgement indicates that failure of the bridge will not significantly endanger the safety of people or property.

3-3.1.2 Load Rating Requirements.

Highway bridges less than 20 feet (6.1 meters) and bridges deemed non-public will be load rated at the discretion of the National Bridge Program Manager.

3-3.2 Highway Bridges in Foreign Territories.

3-3.2.1 Inspection Requirements.

Highway bridges in foreign territories meeting the NBIS span length and public road requirements must conform to the bridge inspection requirements of paragraph 3-2.2. The inspection interval may be extended without approval of the FHWA and at the discretion of the National Bridge Program Manager.

3-3.2.2 Load Rating Requirements.

Highway bridges in foreign territories meeting the NBIS span length and public road requirements must conform to the load rating requirements of paragraph 3-2.3.

3-3.3 Bridge Inventory Data Requirements.

An inventory of non-NBI bridges must be maintained by the Military Department with jurisdiction over those bridges. It is not necessary to transmit SI&A data to the FHWA for bridges on any installation in foreign territory or for “non-NBI” bridges owned by DOD. There is one exception to this: the FHWA needs to be advised about “non-NBI” bridges that go over a Federal-Aid highway, STRAHNET route or connector, or other important structure. Inventory data (not appraisal information) on bridges that fall into this category should be reported if no record of the bridge has been previously reported or if the bridge is modified. Refer to Appendix B, paragraph B-5, for a bridge inspection reporting flowchart.

For the purposes of internal recordkeeping, each agency’s standard SI&A form may be further modified, as desired, to better reflect bridge data in a foreign territory.

CHAPTER 4 RAILROAD BRIDGES

4-1 INTRODUCTION.

Railroad bridges differ from other types of bridges in the types of live loads they undergo, in their modes of failure and distress, and in their construction details. The FRA requires that all track owners have an implemented railroad bridge safety management program including, but not limited to, clear definitions of the roles and responsibilities of all designated qualified personnel; an inventory of all railroad bridges; bridge capacities through load ratings; and detailed bridge inspection policies. Refer to 49 CFR 237 for additional information.

4-1.1 History of FRA Railroad Bridge Inspection Regulations.

Regular inspection of railroad bridges has been an industry practice for over 100 years. Railroad operators learned early in their development through bridge failures, often resulting in fatalities, the importance of comprehensive bridge inspections to ensure that developing flaws did not lead to catastrophe. In 1968, as a result of the Silver Bridge collapse at Point Pleasant, West Virginia, the President established a White House Task Force on Bridge Safety. In support of this task force, the Association of American Railroads (AAR) organized the AAR Railroad Bridge Safety Committee. This committee solicited information from all the railroads in the United States on their bridge inspection, rating, and maintenance practices. Responses from all of the Class I railroads, which made up 94 percent of the nation's railroad mileage, indicated that all of their bridges received a comprehensive inspection by qualified personnel at least once per year. The survey also revealed that every Class I railroad followed bridge inspection and rating practices equal to or greater than the instructions set forth in the Manual of Recommended Practice for Railway Engineering issued jointly by the AAR Engineering Division and the American Railway Engineering Association, a predecessor to the American Railway Engineering and Maintenance-of-Way Association (AREMA) *Manual for Railway Engineering*.

In 1995, the FRA issued an Interim Statement of Policy on the Safety of Railroad Bridges. This was followed in 2000 by a Final Statement of Agency Policy on the Safety of Railroad Bridges. These statements, while non-regulatory, established criteria for railroads to use to ensure the structural integrity of railroad bridges.

With the signing into law of the Railroad Safety Improvement Act of 2008, the FRA was directed to issue regulations requiring track owners to adopt and follow specific procedures to protect the safety of their bridges. As a result, the FRA issued its Bridge Safety Standards, Final Rule, on July 15, 2010. The rule became effective on September 13, 2010, with a staggered implementation schedule whereby the largest freight and passenger railroads were required to comply first, followed by the mid-size and then the smallest railroads.

4-1.2 Applicability.

FRA bridge safety standards apply to all railroad bridges located within CONUS, Alaska, or Hawaii supporting a track with a gage of 2 feet (0.6 meter) or more used to transport freight in railcars moved by railroads that are part of the general railroad system of transportation. Railroad bridges on military installations that meet these criteria fall under the jurisdiction of FRA and must comply with regulations in 49 CFR 237.

The following railroads (and bridges) on military installations do not fall under the jurisdiction of the FRA. However, non-FRA railroad bridges must also be inspected and managed in accordance with UFC paragraphs 4-2, 4-3, and 4-4.

- Bridge structures in foreign territories
- Bridge structures supporting track used exclusively for rapid transit operations
- Bridge structures located within an installation that are not part of the general railroad system and over which the movement of rail equipment is performed only by military or installation employees

4-1.3 Railroad Bridges Reportable to FHWA.

Railroad bridges that go over a Federal-Aid highway, STRAHNET route or connector, or other important structure, must be reported to the FHWA. Inventory data (not appraisal information) on bridges that fall into this category must be reported if no record of the bridge has been previously reported or if the bridge is modified.

4-2 BRIDGE INSPECTION REQUIREMENTS.

4-2.1 Inspection Types.

Bridge inspections are conducted to determine the physical condition of the structure, to develop the basis for load rating analyses, to assess the need for maintenance, and to track the functional condition and rate of deterioration over time. There are seven inspection types requiring unique levels of effort. These inspection types are initial/inventory, routine, damage, in-depth, fracture critical, underwater, and special, as described below.

Any railroad bridge that has been out of service and has not received an inspection within the scheduled time specified in the Railroad Bridge Management Program will be inspected by a Railroad Bridge Inspector and the report reviewed and approved by a Railroad Bridge Engineer prior to reopening to service. Where deemed necessary by the Railroad Bridge Engineer, an updated load rating will be performed for the bridge and filed in the bridge file prior to reopening to service. Late inspections require an explanation to be included in the bridge file.

4-2.1.1 Initial/Inventory Inspection.

The initial/inventory inspection is the first inspection after a bridge is built or added to the installation real property and becomes a part of the bridge file. Elements of the initial/inventory inspection may also apply when there has been a change in configuration of the structure (e.g., widening, lengthening, supplemental bents). It is important for the inspectors to identify any existing problems or locations in the structure where potential problems may arise. A thorough review of as-built plans should be conducted prior to the initial inspection and the inspector should note any FCMs or details during this inspection. A Level 1 scour screening is required if the bridge crosses over a waterway.

Initial inspections must be performed within 90 days of opening to rail traffic. A new railroad bridge must be added to the installation real property and becomes a part of the bridge file prior to opening.

4-2.1.2 Routine Inspection.

A routine inspection is a regularly scheduled inspection to collect observations and measurements of any changes from the initial inspection or any previously conducted inspection.

All routine inspections must be conducted at least once each calendar year, with no more than 540 days between any successive inspections. The Railroad Bridge Engineer may increase routine inspection intervals based on the physical or functional condition of the bridge. It is the responsibility of the Railroad Bridge Engineer to establish criteria for decreased inspection intervals.

4-2.1.3 Damage Inspection.

A damage inspection is a one-time unscheduled inspection to evaluate structural damage resulting from environmental or human actions such as collisions, floods, derailments, fires, or earthquakes, and is performed to establish the repair level of effort. Damage inspections must be performed within a reasonable time after a natural disaster or human-caused action. The inspectors will document all damaged members, measuring, at a minimum, any section loss, member misalignment, and any loss of foundation support. The inspection must provide all information necessary to potentially close the bridge or perform an emergency load restriction. Local installation personnel may make an initial assessment of the bridge if personnel meeting required inspector qualifications are not immediately available. The National Bridge Program Manager may recommend a follow-up in-depth inspection of the bridge to monitor the structure. The National Bridge Program Manager will maintain bridge damage inspection procedures within the railroad bridge management program specific to each event type. Examples of bridge damage inspection instructions are provided in *AREMA Manual for Railway Engineering*, Volume 2, Chapter 10.

4-2.1.4 In-Depth Inspection.

An in-depth inspection is a hands-on, close-up inspection of one or more members above or below the waterline. In-depth inspections are more detailed and may require special access techniques to inspect areas not easily detectable from a routine inspection. The Railroad Bridge Engineer is responsible, in conjunction with the Installation Bridge Manager, for establishing the need for and required interval of an in-depth inspection.

4-2.1.5 Fracture Critical Inspection.

Fracture critical inspections are detailed, hands-on inspections of steel bridges with FCMs that may include visual or other nondestructive evaluations. Prior to inspection, a thorough review of the design or as-built plans, previous inspection reports, load rating, and fatigue-prone details must be made. In the absence of plans or fatigue-prone details, the inspector should be able to determine the fatigue-prone details based on the details provided in Table 6.6.1.2.3-1 of AASHTO LRFDUS-7. FCMs require a “hands-on” inspection where the inspector is capable of touching the area being inspected (arm’s length). Physical inspection methods may be necessary to more accurately assess the condition of an FCM. Advanced inspection methods may need to be employed, including NDT methods. The hands-on inspection will identify and note the condition of problematic details prone to crack development.

For more information regarding inspection techniques for fracture critical bridges, refer to the BIRM or FHWA-NHI-11-015. For additional information and case studies on fatigue damage in welded, bolted, and riveted structures, refer to FHWA’s *Manual for Inspecting Bridges for Fatigue Damage Conditions* and John W. Fisher’s *Fatigue and Fracture in Steel Bridges – Case Studies*.

Fracture critical inspections must be conducted at regular intervals not to exceed 24 months. When a routine inspection interval is decreased due to a FCM finding, it is recommended that the fracture critical inspection interval be decreased to match the routine inspection interval. In order to establish the criteria for fracture critical inspection intervals and level of effort, factors such as bridge age, fatigue-prone details, and known deficiencies must be considered.

4-2.1.6 Underwater Inspection.

4-2.1.6.1. An underwater inspection is diving to visually inspect and measure bridge components, probing for scour or undermining, and sounding to locate the bottom of the channel. The inspection will include such methods as necessary to adequately perform a condition assessment of the structure. If a bridge can be adequately inspected by wading, shallow probing, or with the use of cameras at low water conditions, a formal underwater inspection (divers) is not required. For bridges that do not require a formal underwater inspection, Item 93 on the SI&A form will not be coded. The Installation Bridge Manager will develop a mechanism to ensure inspections occur at low water conditions.

4-2.1.6.2. These inspections must be performed by experienced inspectors determined by the Railroad Program Manager to be competent in underwater inspection procedures. It is recommended that the Underwater Inspection Bridge Inspectors are divers qualified per paragraph 2-1.7 and have completed an approved equivalent to the FHWA-approved underwater bridge inspection diver training course.

4-2.1.6.3. According to the BIRM, there are three levels of underwater inspection intensity:

- Level 1 – Visual, tactile inspection
- Level 2 – Detailed inspection with partial cleaning
- Level 3 – Highly detailed inspection with NDT or PDT

4-2.1.6.4. Level 1 inspections are required for all routine underwater inspections and must be performed within arm's reach of the areas being inspected. Visual inspections are performed across the entire submerged structure, but, in areas of poor water clarity, a tactile sweeping motion of the hands and arms may be utilized to cover the entire substructure.

4-2.1.6.5. Level 2 inspections include cleaning off marine or aquatic growth at critical inspection areas and inspecting high-stress, damaged, and deteriorated areas that may be shielded by the growth. Critical areas near the low waterline, mudline, and midway between will be inspected. Piers and abutments must have at least 1 square foot (0.09 square meter) cleaned at three or more levels on each face. For structures greater than 50 feet (15 meters) in length, an additional three levels must be cleaned at each exposed face. For piles, horizontal bands a minimum of 10 inches (254 millimeters) long will be cleaned along the following locations:

- Rectangular – At least three sides
- Octagonal – At least six sides
- Round – At least 75 percent of circumference
- H-pile – At least the outside faces of flanges and one side of web

4-2.1.6.6. Level 3 inspections include complete cleaning of a structural element and NDT or PDT. Detailed measurements are typically made along with testing techniques such as ultrasonic, physical material sampling, or boring. These inspections are generally performed when a structural repair or possible replacement is being considered.

4-2.1.6.7. Underwater inspections must be completed at regular intervals not to exceed 60 months. The Railroad Bridge Engineer may decrease the interval of underwater inspections based on Level 1 or Level 2 scour evaluations, evidence of substructure movement, stream migration, bank sloughing, or debris buildup. Any deviation in the underwater inspection interval must be documented in the bridge file. Prior to requesting an alteration to underwater inspection intervals, it may be helpful to review FHWA-NHI-10-027. This report not only lists various factors that affect the

needed interval of underwater inspection but also contains valuable information on underwater inspection techniques, underwater repair techniques, and scour issues.

4-2.1.7 Special Inspection.

Inspections that monitor a known member deficiency or other conditions that warrant special attention, such as foundation settlement or scour, fatigue damage, severe section loss; or to evaluate damage caused by a natural or accidental event, including, but not limited to, flood, fire, earthquake, derailment, or vehicular or vessel impact. Based on these criteria, the Railroad Bridge Engineer will determine when special inspections are required. A special inspection must be performed based on the criteria in 49 CFR 237, Subpart E, *Bridge Inspection*.

4-2.2 Inspection Procedures.

The Railroad Bridge Engineer must specify the bridge inspection procedures in conformance with the requirements of 49 CFR 237. The bridge inspection procedures will include the following:

- Methods, means of access, and level of detail to be recorded for the various components of that bridge or class of bridges
- Assurance that the level of detail and the inspection procedures are appropriate to the bridge configuration, conditions found during previous inspections, the nature of the railroad traffic, and vulnerability of the bridge to damage
- Be designed to detect, report, and address deterioration and deficiencies before they present a hazard to safe train operation

Bridge inspections must be conducted under the direct supervision of a designated Railroad Bridge Inspector. A bridge or portion of a bridge may be inspected more frequently when a Railroad Bridge Engineer deems necessary, considering the conditions noted during previous inspections, bridge type and configuration, weight and frequency of rail traffic, and the type or nature of rail traffic. In addition, bridge inspection reports will be reviewed by Railroad Bridge Engineers and railroad bridge supervisors to:

- Determine whether inspections have been performed in accordance with the prescribed schedule and specified procedures
- Evaluate whether any items on the report represent a present or potential hazard to safety
- Prescribe any modifications to the inspection procedures or inspection interval for that particular bridge
- Determine the need for further higher-level review

4-3 LOAD RATING AND LOAD RESTRICTION REQUIREMENTS.

All railroad bridges must have a load rating on file within the railroad bridge file performed by a Railroad Bridge Engineer. The load ratings will be expressed in terms of numerical values related to a standard system of train loads (i.e., Cooper E-equivalent configuration).

All railroad bridge load rating methods are recommended to abide by AREMA *Manual for Railway Engineering*, Volume 2, Chapter 7. Timber bridges are addressed in Chapter 7, concrete bridges are addressed in Chapter 8, and steel bridges are addressed in Chapter 15. As an alternative to evaluating the capacity of railroad bridge components within the aforementioned chapters, other methods prescribed by the Railroad Bridge Engineer may be utilized, such as strain gage data, deflection measurements, or non-destructive testing for identifying embedded concrete reinforcement. All methods used to determine the capacity of the bridge must be clearly stated in the bridge file.

In addition, the Railroad Bridge Engineer will issue instructions specifying the maximum equipment weight along with either the minimum equipment length or axle spacing. These instructions are for use by those persons responsible for controlling the movement of rail equipment over railroad bridges to ensure the bridges are not overloaded. For railroad bridges that present horizontal or vertical restrictions, the Railroad Bridge Engineer will issue instructions necessary to prevent damage from over-dimension loads. Refer to 49 CFR 237.73 for further information.

4-4 BRIDGE MANAGEMENT PROGRAM REQUIREMENTS.

The National Bridge Program Manager is responsible for maintaining the railroad bridge management program and ensuring its continued compliance with this UFC and FRA guidelines. At a minimum, the program must include all of the following:

- An accurate inventory of railroad bridges
- A record of the safe load capacity of each bridge
- A provision to obtain and maintain design documents, including repairs, modifications, and inspections of each bridge
- A bridge inspection program covering as a minimum:
 - Inspection personnel safety considerations;
 - Types of inspection, including required detail;
 - Definitions of defect levels and associated condition codes if condition codes are used;
 - The method of documenting inspections, including standard forms or formats;
 - Structure type and component nomenclature; and

- Numbering or identification protocol for substructure units, spans, and individual components

The railroad bridge management program must include, at a minimum, the following requirements:

- Record of each inspection required to be performed
- Record of an inspection will be prepared from notes taken on the day(s) the inspection was made and will be dated with the date(s) the physical inspection takes place and the date the record is created
- Each bridge inspection report must include, at a minimum, the following information:
 - A precise identification of the bridge inspected;
 - Date on which the physical inspection was completed;
 - Identification and written or electronic signature of the inspector;
 - Type of inspection performed;
 - Identification of inspection findings requiring expedited or critical review by a Railroad Bridge Engineer and any restrictions placed at the time of inspection;
 - Condition of components inspected; and
 - Identification of the portions of the bridge that were inspected
- Initial report of each bridge will be placed in the bridge file within 30 calendar days of the completion of inspection
- Complete report of each bridge inspection within 120 calendar days of the completion of the inspection

Refer to 49 CFR 237.109 for additional information on what FRA requires for bridge inspection records.

CHAPTER 5 PEDESTRIAN BRIDGES AND GOLF CART BRIDGES

5-1 BRIDGE INSPECTION REQUIREMENTS.

Pedestrian bridges and golf cart bridges must be inspected at a minimum interval of 48 months if the bridge crosses a highway, crosses a railroad, or if failure of the bridge could significantly endanger the safety of people or property. The National Bridge Program Manager approves the bridges requiring inspection and the required inspection interval.

5-2 LOAD RATING REQUIREMENTS.

Pedestrian bridges and golf cart bridges must be load rated if the bridge crosses a highway, crosses a railroad, or if failure of the bridge could endanger the safety of people or property. If a pedestrian bridge load rating is less than 60 pounds per square foot (psf) (293 kilograms per square meter), the bridge must be posted for reduced pedestrian traffic. If a pedestrian bridge load rating is performed and found to be less than 40 psf (195 kilograms per square meter), the bridge must be closed to pedestrian traffic until it is repaired. AASHTO GSDPB-2-UL, *LRFD Guide Specifications for Design of Pedestrian Bridges*, is a good reference for this topic.

Pedestrian and golf cart bridges intended to support maintenance or emergency vehicles will meet the load rating and inspection requirements of highway bridges. These bridges must be posted and barricaded or equipped with bollards to prevent non-emergency vehicle use.

5-3 BRIDGE INVENTORY DATA REQUIREMENTS.

An inventory of inspected pedestrian and golf cart bridges must be maintained by the Military Department with jurisdiction over those bridges. Do not include these bridges in the NBI provided to FHWA. However, the FHWA must be advised about bridges that go over a Federal-Aid highway, STRAHNET route or connector, or other important structure. Inventory data (not appraisal information) on bridges that fall into this category will be reported if no record of the bridge has been previously reported or if the bridge is modified. Refer to Appendix B, paragraph B-5, for a bridge inspection reporting flowchart.

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CHAPTER 6 SPECIAL BRIDGE TYPES

6-1 COMPLEX BRIDGES.

Complex bridges must be inspected and reported to the FHWA per the requirements specified in the UFC. Complex bridges include movable, suspension, and cable-stayed bridges, as well as other bridges with unusual characteristics. The National Bridge Program Manager will identify specialized bridge inspection procedures and any additional inspector training and experience necessary to safely and accurately perform the inspections.

6-2 TAXIWAY BRIDGES.

All taxiway bridges must be inspected at least every two years and load rated to ensure the bridge can safely carry airfield traffic. All requirements for NBI bridges apply for taxiway bridges. Since the NBI requires reporting of only highway bridges based on the type of traffic “over” the bridge, taxiway bridges over highways will not be included in the NBI reporting to FHWA.

6-3 MILITARY BRIDGE SET TRUSS PANEL BRIDGES.

Although originally intended for temporary, battlefield applications, prefabricated military bridge sets (i.e., Bailey and Mabey-Johnson or similar truss panel bridges) often remain in use in a permanent capacity. Army Technical Manual (TM) 3-34.23, *M2 Bailey Bridge*, contains useful information on the Bailey system and load capacities.

Because there are many variations of the Bailey and Mabey-Johnson bridge systems, it is recommended that the manufacturer’s literature be consulted prior to performing a load rating of these bridge types. In lieu of using the manufacturer’s loading data, it is also permissible to load-rate these bridges as a generic truss; however, this procedure will be time-consuming due to the amount of calculations involved.

Military bridge set bridges meeting the criteria for a reportable bridge must abide by the requirements of paragraph 3-2.

6-4 MODEL AND TRAINING BRIDGES.

Model and training bridges are commonly found on installations. They are often referred to as research, development, testing and evaluation (RDT&E) models, simulations, or replicas. These are not real property, are not reportable, and will not be part of the installation bridge inventory database, nor will they be part of the NBI. They must be closed off to all traffic (other than vehicles used for testing or training) and stored in a secure, locked area when not in use. If a load rating or actual regular traffic use on these bridges is desired, an initial inspection will be performed prior to adding the structure to the bridge inventory.

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CHAPTER 7 COMMON REQUIREMENTS OF ALL BRIDGES

7-1 CRITICAL FINDINGS.

Critical findings are defined as structural or safety-related deficiencies that require immediate follow-up inspection or action. It is the responsibility of the National Bridge Program Manager to implement procedures for addressing critical deficiencies, including:

- Immediate critical deficiency reporting steps
- Emergency notification of police and the public
- Rapid evaluation of the deficiencies
- Rapid implementation of corrective or protective actions
- A tracking system to ensure adequate follow-up
- Provisions for identifying other bridges with similar structural details for follow-up inspections

The National Bridge Program Manager must establish a bridge program procedure to ensure that critical findings are addressed in a timely manner and in conformance with Appendix B, paragraph B-8, “Flow Chart for Critical Findings.” General steps must be taken to assure that critical findings are identified and resolved as quickly and efficiently as possible. Viable options include permanent repair, temporary repair, and restriction of load on a bridge. Refer to the BIRM, Topic 4.5, “Critical Findings,” for additional information and guidance on addressing critical findings.

7-1.1 Inspection Procedures and Reporting.

The bridge program procedure must require the immediate verbal notification of a potential critical finding to the National Bridge Program Manager and Load Rating Engineer. In addition to the verbal notification, the procedures should include a written notification following a standardized format in either hardcopy or electronic format. See Appendix B, paragraph B-9, for a sample Critical Inspection Finding Report form. The written notification should include notes, photographs, and sketches and/or drawings to accurately portray the potential critical finding. Temporary actions may also be taken to safeguard the public until proper repairs are completed. These actions may include:

- Load posting
- Traffic restrictions from the damaged area
- Speed restrictions
- Temporary lane closure

- Temporary shoring
- Complete bridge closure

After submittal of the written report, the finding will be assessed and severity established with the proper repair strategy or POA. The procedures will require notification of critical findings for reportable highway bridges to the FHWA.

The BIRM, Chapter 4.5.3, lists numerous examples of critical findings for timber, steel, and concrete bridges, for both reduced load capacity and public safety hazard conditions.

7-1.2 Prioritizing Maintenance Procedures.

The National Bridge Program Manager must establish prioritization criteria to help facilitate maintenance work plan strategies. A list of example priority criteria can be found in the BIRM, Topic 4.5.

7-1.3 Plan of Action (POA).

A POA will be developed and approved within seven calendar days of a critical finding. It may be necessary to begin addressing a critical finding prior to full development and acceptance of a POA. It is the responsibility of the National Bridge Program Manager, in conjunction with the Installation Bridge Manager, to implement procedures for addressing critical deficiencies, including:

- Immediate critical deficiency reporting steps
- Emergency notification of police and the public
- Rapid evaluation of the deficiencies
- Rapid implementation of corrective or protective actions
- A tracking system to ensure adequate follow-up
- Provisions for identifying other bridges with similar structural details for follow-up inspections

7-1.4 Repair.

Critical findings that significantly impact a bridge's structural integrity and/or create a safety hazard will be addressed immediately through complete or partial bridge closure or repair. A critical finding that impacts a bridge's structural integrity will be retrofitted through short-term repairs (i.e., temporary shoring or bracing) or permanent repairs that are designed and constructed to restore the affected member(s) to their original load capacity. This may include installation of new structural steel plates or shapes; removal and replacement of deteriorated concrete and steel reinforcing; or installation of other

materials (e.g., timber, steel cable, fiber reinforced polymer composites, masonry), depending on the structure type.

Critical findings that create a safety hazard (e.g., broken railings or safety devices that may not provide proper containment or redirection; loose concrete or steel that creates a falling hazard) will be isolated by removing traffic from the area of the hazard until the hazard is removed and/or repaired.

The FHWA will be notified annually of critical finding repairs and post-repair progress which impacts data for NBI highway bridges.

7-2 SCOUR EVALUATION.

7-2.1 Scour Screening.

All existing bridges must be screened to determine their vulnerability to scour. This includes, but is not limited to, a Level 1 stream stability analysis and a review of the existing bridge plans. Critical information from the bridge plans includes, but is not limited to, the foundation types, locations, and depths. If this level of analysis indicates that the bridge is not susceptible to scour then the bridge should be appropriately coded and continue to be monitored during each routine inspection. HEC-18, *Evaluating Scour at Bridges*, Table 10.2, provides a list of items to consider when assessing the susceptibility of a bridge to scour.

7-2.2 Unknown Foundation Coding.

For bridges with an unknown foundation and determined through a Level 1 stream stability analysis to not be susceptible to scour, Code Item 113 will remain “U” and a scour critical POA will be prepared until a higher-level analysis has been performed.

7-2.3 Higher Level Scour Analysis.

If after the initial screening the bridge is susceptible to scour, additional analysis is needed. This includes the evaluation of the flooding history of the bridge and the development of a hydraulic model (typically the Army Hydrologic Engineering Center’s River Analysis System [HEC-RAS]) to determine the scour potential at the bridge site. Higher level scour evaluations must be performed by a Hydraulic Bridge Engineer who is a professional engineer with relevant work experience in bridge hydraulic modeling and scour evaluations. This scour evaluation should also consider the potential for debris collecting on the bridge substructure. Previous inspection reports, along with the current channel stability and observed debris, will provide guidance. Once the theoretical (potential) scour depth is determined from the hydraulic model, this depth should be compared to the existing foundation depths so a determination can be made as to the bridge’s overall susceptibility to scour. This process involves a multi-disciplinary team approach that should include hydraulic, geotechnical, and structural engineers to determine the reasonableness of the results. If, after this analysis, any bridge can be considered unstable should the potential scour depth be reached, it should be considered “scour critical” and a POA, including a detailed plan for potential

bridge closure, should be developed. See Appendix B, paragraph B-7, for an example Scour Critical Bridge POA.

7-2.4 2D Hydraulic Model.

Some bridge crossings, such as tidally influenced bridges or a wide floodplain that contains multiple bridges, will require a higher level of hydraulic analysis. A 2D hydraulic model will be conducted to analyze the scour susceptibility.

7-2.5 Unknown Foundation Risk Analysis.

Bridges are classified as having unknown foundations when the type and depth of foundations are unknown. The initial approach is to perform extensive data mining to ensure the foundations are in fact unknown. If the foundations are in fact unknown, HEC-18, Appendix F, provides guidance for performing a risk-based analysis to prioritize bridges for further evaluation. Each Military Department is responsible for implementing a risk-based approach to reclassify bridges with unknown foundations and subsequently evaluate the susceptibility to scour. HEC-18, Appendix F, recommends to first prioritize bridges based on their functional classification. Secondly, collect historical documentation of foundation and design practices based on the date of original construction, consider the subsurface conditions and bridge standards from nearby bridges, and/or perform proven NDT to assess foundation type and length. Once the information has been gathered, perform a scour evaluation based on the data and update Code Item 113 accordingly. If the scour evaluation determines the bridge to be scour critical (items to be coded with a 3, 2, or 1), a POA will be implemented for the bridge. For bridges with unknown foundations even after a risk analysis has been performed, a POA will be implemented that includes a bridge closure plan. FHWA *Attachment "B" – Guidance for Developing and Implementing Plans of Action for Bridges with Unknown Foundations* provides recommended steps for developing POAs for bridges with unknown foundations.

7-2.6 Unknown Foundation Evaluation.

FHWA and the Florida Department of Transportation (FDOT) published a manual titled *Procedural Manual: Reclassify Unknown Foundation Bridges*, that provides detailed procedures and guidelines for evaluating bridges with unknown foundations through a risk-based approach. The manual provides multiple flow charts to assist in evaluating unknown foundations, including steps to reclassify bridges with unknown foundations, reverse engineering for estimating unknown pile embedment, and recommended NDT methods for multiple foundation types.

7-2.7 Scour Critical POA.

Bridges that are considered scour critical must have a detailed POA in the bridge file. See Appendix B, paragraph B-7, for an example Scour Critical Bridge POA.

7-3 FRACTURE CRITICAL PLAN.

A fracture critical member (FCM) is a steel member in tension or with a tension element whose failure could potentially cause a portion of or the entire bridge to collapse. A fracture critical plan identifies all FCMs on a bridge, establishes an inspection interval, and determines inspection methods. Fracture critical plans will be developed and maintained for each fracture critical bridge in the bridge file. The plan must, at a minimum, include:

- Bridge identification
- Bridge location (with map)
- Structure description
- Means of access
- Identification of all FCMs (plan and elevation sketch with FCMs identified)
- List of all relevant AASHTO fatigue-prone details with photo references

Table 6.6.1.2.3-1 in AASHTO LRFDUS-7 presents fatigue-prone details caused by in-plane stresses and categorizes them in Categories A through E. The table provides the inspector categories for classifying fatigue-prone details for fracture critical bridges. The letter designation is a rating assigned to a detail that represents its fatigue strength, with “A” being the highest and “E” being the lowest. Refer to Appendix B, paragraph B-6, for an example fatigue-prone detail form.

Refer to the BIRM, Topic 6.4, “Fatigue and Fracture in Steel,” for additional information on FCMs.

7-4 SEISMIC EVALUATION.

All bridges must be evaluated to determine if further analysis is warranted for seismic activity, and, if necessary, further investigation will be recommended. Refer to Part 1 of FHWA-RD-94-052, *Seismic Retrofitting Manual for Highway Structures*. The retrofit philosophy in FHWA-RD-94-052 is performance-based and distinguishes between important new bridges and less-important bridges near the end of their service life. Based on bridge importance and desired service life, categories are assigned for screening, in-depth evaluation, and retrofitting. Numerous retrofit options exist, such as restrainers, bridge seat extensions, column jackets, footing overlays, and soil remediation.

7-5 TRAFFIC SAFETY DEVICES.

All roadsides and bridges/structures must have traffic safety devices (e.g., guardrail, end treatments, delineators) installed according to AASHTO GDHS-6, *A Policy on Geometric Design of Highways and Streets (Green Book)*, AASHTO RSDG-4, *Roadside Design Guide*, and FHWA MUTCD. For facilities that carry low-volume traffic, traffic safety devices may be installed based on the provisions of AASHTO VLVLR-1, *Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT ≤ 400)*.

MUTCD Section 5A.01 defines a “low-volume road” as a facility lying outside of built-up cities, towns, and communities, and having a volume of less than 400 average annual daily traffic (AADT). Low-volume roads will not be freeways, expressways, interchange ramps, freeway service roads, roads on a designated state highway system, or a residential street in a neighborhood. For bridges not on the National Highway System, each Military Department must establish criteria for updating traffic safety devices. Factors to consider when establishing these criteria are roadway volume, posted speed limit, and approach roadway geometry (e.g., low-volume, low-speed roadways with good geometry are less prone to crashes with vehicles leaving the roadway). The AASHTO-AGC-ARTBA Task Force 13 *A Guide to Standardized Highway Barrier Hardware*, as well as local standards for traffic safety, are also recommended resources.

7-6 CLOSED BRIDGES.

Signage must be placed to identify a bridge as being closed to vehicular and/or pedestrian traffic. Physical barriers of a mass not easily moved will be positioned to prevent access to the structure.

CHAPTER 8 BRIDGE MAINTENANCE

8-1 INTRODUCTION.

A goal of this UFC is to ensure that installation bridges are maintained in a safe, usable condition. Preventive maintenance is a planned strategy of cost-effective treatments applied at the proper time to preserve and extend the useful life of a bridge.

8-2 INDUSTRY PRACTICE.

Any deficiencies requiring maintenance identified in an inspection will be expediently addressed. The Installation Bridge Manager will review all inspection reports and provide a report of deficiencies requiring maintenance to the National Bridge Program Manager in a timely manner.

Bridge maintenance must be conducted in accordance with the latest industry practice. Valuable references include American Concrete Institute (ACI) 345.1R-16, *Guide for Maintenance of Concrete Bridge Members*; ACI SP-277, *Recent Advances in Maintenance and Repair of Concrete Bridges*; AASHTO MM-4, *Maintenance Manual for Roadways and Bridges*; and FHWA-NHI-14-050, *Bridge Maintenance Training Reference Manual*.

General maintenance encompasses cleaning activities such as annually water-flushing all decks, drains, bearings, joints, pier caps, abutment seats, rails, and parapets (typically in the spring). Preventive maintenance encompasses routine activities such as painting; minor coating and sealant applications; minor deck membrane and wearing surface patching; and railing repairs. Stream channel maintenance encompasses activities such as debris removal. Consideration should be given to prioritizing any maintenance recommendations from the bridge inspection reports.

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CHAPTER 9 BRIDGE REPAIR

9-1 INTRODUCTION.

A goal of this UFC is to ensure that bridge deficiencies are discovered and repaired in a timely manner so installation bridges remain open and in a safe, usable condition.

9-2 INDUSTRY PRACTICE.

Bridge repairs must be conducted in accordance with the latest industry practice. Valuable references include Part 2 of FHWA-RD-94-052, *Seismic Retrofitting Manual for Highway Structures*, and FHWA HEC-23, *Bridge Scour and Stream Instability Countermeasures*. Additionally, 49 CFR 237.131 and 49 CFR 237.133 include requirements for the design and supervision of railroad bridge repairs.

Repairs encompass activities such as jacking up the structure, epoxy injection of cracks, adjusting bearing systems, sealing expansion joints, major deck patching, major applications of coatings and sealants, and reinforcement of structural members like stringers, beams, piers, pier caps, pile caps, abutments, and footings. Stream channel repairs encompass activities such as stabilizing banks and correcting erosion problems. Consideration should be given to prioritizing any repair recommendations from the bridge inspection reports.

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APPENDIX B BEST PRACTICES

B-1 MILITARY LOAD CLASSIFICATION (MLC) AND MILITARY VEHICLE LIVE LOAD DATA.

Excerpted from FM 3-34.343, *Military Nonstandard Fixed Bridging*, Appendix B, "Vehicle Classification", 12 February 2002, Headquarters, Department of the Army, Washington, DC:

[Note: Minor edits have been made for this appendix to eliminate non-relevant material, typos, and page number references from FM 3-34.343. Ultimately, all data herein is based on NATO STANAG 2021.]

Vehicles are assigned MLC numbers, which represent the loading effects they have on a bridge. The MLC does not represent the actual weight of a vehicle. It represents a combination of factors that include gross weight, axle spacing, weight distribution to the axles, and speed. All standard Army vehicles and special equipment that use bridges of military importance have an MLC. Trailers that are rated with a payload of 1.5 tons or less are exceptions. They have a combined classification with their towing vehicle. Classifying vehicles, trailers, or vehicle combinations with a gross weight of 3 tons or less is optional.

Table B-1 shows 16 standard classes of hypothetical vehicles ranging from 4 to 150. The weight of the tracked vehicle in short tons was chosen as the classification number. A wheeled vehicle has a weight greater than its classification number. Each classification number has a specified maximum single-axle load. Also specified are the maximum tire load, the minimum tire size, and the maximum tire pressure. The classification numbers were originally developed from studies of the hypothetical vehicles having characteristics about the same as the actual military vehicles of NATO nations.

The moment and shear forces produced by the hypothetical vehicles or single-axle loads are provided in Tables B-2 and B-3. These figures are based on the assumption that the nearest ground contact points of two different vehicles (wheeled or tracked) are 100 feet apart. Table B-1 gives critical tire loads and tire sizes.

Standard classification curves were developed for classifying vehicles, for designing nonstandard bridges, and for estimating the capacity of existing bridges. Each standard class has a moment and a shear curve (Figure B-1 and Figures B-2 through B-4). The maximum moment and shear forces were induced against the simple-span lengths by the hypothetical vehicles for each standard class. These forces were plotted to determine the curves. The actual values for the curves are found in Tables B-2 and B-3. Note that in the curves, shear is represented in units of kips; however, in Table B-3, shear is represented in units of tons. No allowance is made for impact, and the assumption is made that all vehicles will maintain the normal convoy spacing of 100 feet between ground contact points.

Table B-1 Standard Classes of Hypothetical Vehicles

Hypothetical Vehicles for Classification of Actual Vehicles and Bridges			
1	2	3	4
Class	Tracked Vehicles	Wheeled Vehicles	
		Axle Loads and Spacing	Maximum Single-Axle Load (in Short Tons)
4			
8			
12			
16			
20			
24			
30			
40			
NOTES: 1. The single-axle tire sizes shown in Columns 5, 6, and 7 refer to the maximum single-axle loads given in Column 4. 2. The bogie-axle tire sizes shown in Columns 5, 6, and 7 refer to the maximum bogie-axle loads shown on the diagrams in Column 3. 3. The maximum tire pressure for all tires shown in Column 8 should be taken as 75 psi. The first dimension of tire size refers to the overall width of the tire and the second dimension is the rim diameter of the tire.			

[Note: There is a typo in Column 3, Class 12 above, as the axle loads shown do not add up to 15 tons. The middle two axles should be labeled 5, not 6.]

Table B-1 Standard Classes of Hypothetical Vehicles (cont.)

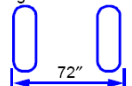
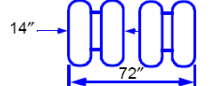


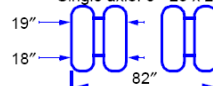

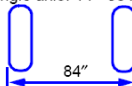
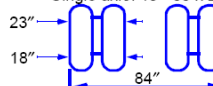

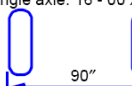
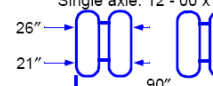


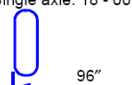

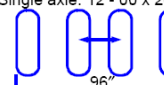

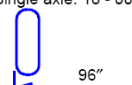
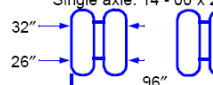
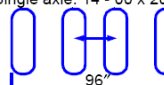

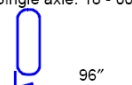
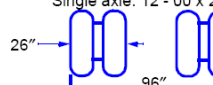
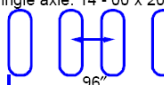

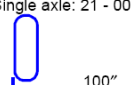
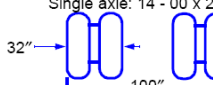
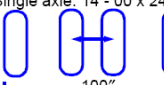

Hypothetical Vehicles for Classification of Actual Vehicles and Bridges				
1	5	6	7	8
Class	Wheeled Vehicles			
	Minimum Wheel Spacing and Tire Sizes of Critical Axles			Maximum Tire Load and Minimum Tire Size
4	Single axle: 7 - 50 x 20  72" Bogie axle: 7 - 50 x 20	Single axle: 6 - 00 x 20 14"  72" Bogie axle: 6 - 00 x 16		 2,500 lb on 7 - 50 x 20
8	Single axle: 12 - 00 x 20  82" Bogie axle: 9 - 00 x 20	Single axle: 8 - 25 x 20 19" 18"  82" Bogie axle: 7 - 50 x 20		 5,500 lb on 12 - 00 x 20
12	Single axle: 14 - 00 x 20  84" Bogie axle: 9 - 00 x 20	Single axle: 10 - 00 x 20 23" 18"  84" Bogie axle: 7 - 50 x 20		 8,000 lb on 14 - 00 x 20
16	Single axle: 16 - 00 x 24  90" Bogie axle: 14 - 00 x 20	Single axle: 12 - 00 x 20 26" 21"  90" Bogie axle: 9 - 00 x 20	Single axle: 21 - 00 x 20  90" Bogie axle: 9 - 00 x 20	 10,000 lb on 16 - 00 x 24
20	Single axle: 18 - 00 x 24  96" Bogie axle: 14 - 00 x 24	Single axle: 12 - 00 x 20 26"  96" Bogie axle: 12 - 00 x 20	Single axle: 12 - 00 x 20  96" Bogie axle: 12 - 00 x 20	 11,000 lb on 18 - 00 x 24
24	Single axle: 18 - 00 x 24  96" Bogie axle: 16 - 00 x 24	Single axle: 14 - 00 x 20 32" 26"  96" Bogie axle: 12 - 00 x 20	Single axle: 14 - 00 x 20  96" Bogie axle: 12 - 00 x 20	 12,000 lb on 18 - 00 x 24
30	Single axle: 18 - 00 x 24  96" Bogie axle: 16 - 00 x 24	Single axle: 12 - 00 x 20 26"  96" Bogie axle: 12 - 00 x 20	Single axle: 14 - 00 x 20  96" Bogie axle: 12 - 00 x 20	 13,500 lb on 18 - 00 x 24
40	Single axle: 21 - 00 x 24  100" Bogie axle: 18 - 00 x 24	Single axle: 14 - 00 x 24 32"  100" Bogie axle: 14 - 00 x 20	Single axle: 14 - 00 x 24  100" Bogie axle: 14 - 00 x 20	 17,000 lb on 21 - 00 x 24
NOTES: 1. The single-axle tire sizes shown in Columns 5, 6, and 7 refer to the maximum single-axle loads given in Column 4. 2. The bogie-axle tire sizes shown in Columns 5, 6, and 7 refer to the maximum bogie-axle loads shown on the diagrams in Column 3. 3. The maximum tire pressure for all tires shown in Column 8 should be taken as 75 psi. The first dimension of tire size refers to the overall width of the tire and the second dimension is the rim diameter of the tire.				

Table B-1 Standard Classes of Hypothetical Vehicles (cont.)

Hypothetical Vehicles for Classification of Actual Vehicles and Bridges			
1	2	3	4
Class	Tracked Vehicles	Wheeled Vehicles	
		Axle Loads and Spacing	Maximum Single-Axle Load (in Short Tons)
50			
60			
70			
80			
90			
100			
120			
150			
NOTES: 1. The single-axle tire sizes shown in Columns 5, 6, and 7 refer to the maximum single-axle loads given in Column 4. 2. The bogie-axle tire sizes shown in Columns 5, 6, and 7 refer to the maximum bogie-axle loads shown on the diagrams in Column 3. 3. The maximum tire pressure for all tires shown in Column 8 should be taken as 75 psi. The first dimension of tire size refers to the overall width of the tire and the second dimension is the rim diameter of the tire.			

Table B-1 Standard Classes of Hypothetical Vehicles (cont.)

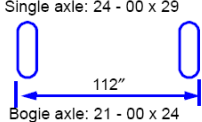
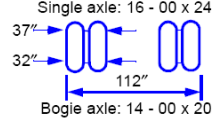
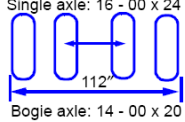

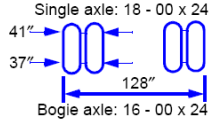
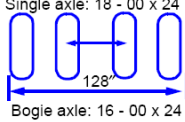

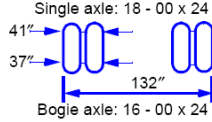
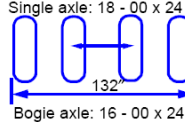

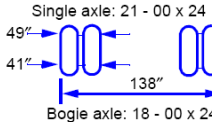
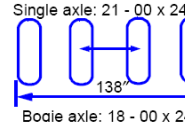

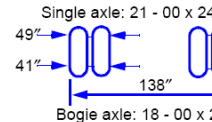
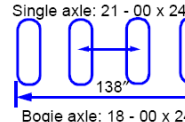

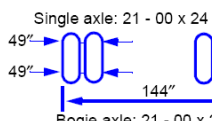
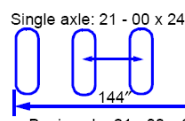

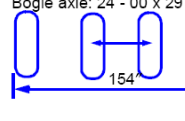

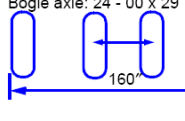

Hypothetical Vehicles for Classification of Actual Vehicles and Bridges				
1	5	6	7	8
Class	Wheeled Vehicles			
	Minimum Wheel Spacing and Tire Sizes of Critical Axles			Maximum Tire Load and Minimum Tire Size
50	 <p>Single axle: 24 - 00 x 29 112" Bogie axle: 21 - 00 x 24</p>	 <p>Single axle: 16 - 00 x 24 37" 32" 112" Bogie axle: 14 - 00 x 20</p>	 <p>Single axle: 16 - 00 x 24 112" Bogie axle: 14 - 00 x 20</p>	 <p>20,000 lb on 24 - 00 x 29</p>
60		 <p>Single axle: 18 - 00 x 24 41" 37" 128" Bogie axle: 16 - 00 x 24</p>	 <p>Single axle: 18 - 00 x 24 128" Bogie axle: 16 - 00 x 24</p>	 <p>20,000 lb on 24 - 00 x 29</p>
70		 <p>Single axle: 18 - 00 x 24 41" 37" 132" Bogie axle: 16 - 00 x 24</p>	 <p>Single axle: 18 - 00 x 24 132" Bogie axle: 16 - 00 x 24</p>	 <p>20,000 lb on 24 - 00 x 29</p>
80		 <p>Single axle: 21 - 00 x 24 49" 41" 138" Bogie axle: 18 - 00 x 24</p>	 <p>Single axle: 21 - 00 x 24 138" Bogie axle: 18 - 00 x 24</p>	 <p>20,000 lb on 24 - 00 x 29</p>
90		 <p>Single axle: 21 - 00 x 24 49" 41" 138" Bogie axle: 18 - 00 x 24</p>	 <p>Single axle: 21 - 00 x 24 138" Bogie axle: 18 - 00 x 24</p>	 <p>20,000 lb on 24 - 00 x 29</p>
100		 <p>Single axle: 21 - 00 x 24 49" 49" 144" Bogie axle: 21 - 00 x 24</p>	 <p>Single axle: 21 - 00 x 24 144" Bogie axle: 21 - 00 x 24</p>	 <p>20,000 lb on 24 - 00 x 29</p>
120			 <p>Bogie axle: 24 - 00 x 29 154"</p>	 <p>20,000 lb on 24 - 00 x 29</p>
150			 <p>Bogie axle: 24 - 00 x 29 160"</p>	 <p>21,000 lb on 24 - 00 x 29</p>
NOTES: 1. The single-axle tire sizes shown in Columns 5, 6, and 7 refer to the maximum single-axle loads given in Column 4. 2. The bogie-axle tire sizes shown in Columns 5, 6, and 7 refer to the maximum bogie-axle loads shown on the diagrams in Column 3. 3. The maximum tire pressure for all tires shown in Column 8 should be taken as 75 psi. The first dimension of tire size refers to the overall width of the tire and the second dimension is the rim diameter of the tire.				

Table B-2 Wheeled- and Tracked-Vehicle Moment (kip-feet)

Class	Wheeled/ Tracked	Span Length (feet)										
		4	6	8	10	12	14	16	18	20	25	30
4	W	4.96	7.44	9.92	12.40	14.88	17.92	21.40	25.60	30.00	41.00	52.20
	T	2.64	6.00	9.92	14.00	18.00	22.10	25.90	29.90	34.00	44.00	54.00
8	W	10.96	16.44	21.90	27.40	32.90	38.30	43.60	49.30	54.80	71.00	93.60
	T	4.88	11.04	19.04	27.00	35.00	43.10	50.90	59.00	66.80	87.00	106.80
12	W	16.00	24.00	32.00	40.00	48.00	56.00	64.00	72.00	80.80	112.50	145.20
	T	5.44	12.00	21.30	33.00	44.90	57.10	69.10	81.00	92.80	123.00	153.00
16	W	20.00	30.00	40.00	50.00	60.00	70.00	80.00	92.50	105.20	144.00	184.20
	T	7.12	15.96	28.50	44.00	60.00	75.90	91.80	108.00	124.00	164.00	204.00
20	W	22.00	33.00	44.00	55.00	70.80	87.40	104.00	121.00	137.60	188.50	241.00
	T	8.88	20.00	35.50	55.00	74.90	94.90	114.90	135.00	154.80	205.00	255.00
24	W	24.00	36.00	48.00	64.00	83.30	102.80	122.60	142.20	162.00	223.00	285.00
	T	10.64	24.00	42.70	66.00	90.00	114.00	137.90	162.00	186.00	246.00	306.00
30	W	26.70	40.40	53.90	70.40	91.70	113.10	134.70	156.60	178.00	246.00	316.00
	T	10.88	24.50	43.70	68.20	97.40	127.40	157.40	187.60	218.00	293.00	367.00
40	W	34.00	51.00	68.00	85.00	108.30	133.80	159.40	185.00	210.00	277.00	359.00
	T	13.36	30.00	53.30	83.40	120.00	158.90	200.00	240.00	280.00	380.00	480.00
50	W	40.00	60.00	80.00	100.00	125.00	154.30	183.70	213.00	243.00	320.00	415.00
	T	15.36	34.60	61.60	96.20	138.50	187.60	237.00	288.00	338.00	463.00	587.00
60	W	46.00	69.00	92.00	115.00	138.00	170.00	205.00	240.00	276.00	365.00	474.00
	T	17.12	38.50	68.60	107.20	154.30	210.00	270.00	330.00	390.00	540.00	690.00
70	W	51.00	76.40	101.90	127.40	157.90	198.20	239.00	280.00	322.00	426.00	557.00
	T	18.64	42.00	74.70	116.60	168.00	229.00	298.00	368.00	438.00	613.00	787.00
80	W	56.00	84.00	112.00	140.00	180.50	227.00	273.00	320.00	368.00	486.00	636.00
	T	20.00	45.00	80.00	125.00	180.00	245.00	320.00	400.00	480.00	680.00	880.00
90	W	60.00	90.00	120.00	151.80	203.00	225.00	308.00	360.00	414.00	547.00	716.00
	T	21.20	47.60	84.60	132.40	190.60	259.00	339.00	427.00	518.00	743.00	967.00
100	W	64.00	96.00	128.00	160.00	203.00	259.00	317.00	375.00	434.00	581.00	765.00
	T	22.20	50.00	89.00	138.80	199.90	272.00	356.00	450.00	550.00	800.00	1,050.00
120	W	72.00	108.00	144.00	180.00	243.00	311.00	380.00	450.00	520.00	697.00	918.00
	T	24.00	54.00	96.00	150.00	216.00	294.00	384.00	486.00	600.00	900.00	1,200.00
150	W	84.00	126.00	168.00	210.00	253.00	331.00	410.00	491.00	572.00	777.00	1,032.00
	T	25.00	56.30	100.00	156.20	225.00	306.00	400.00	506.00	625.00	975.00	1,350.00

Table B-2 Wheeled- and Tracked-Vehicle Moment (kip-feet) (cont.)

Class	Wheeled/ Tracked	Span Length (feet)									
		35	40	45	50	55	60	70	80	90	100
4	W	63.70	75.20	86.40	97.00	108.90	120.00	142.80	164.80	187.20	210.00
	T	63.70	73.80	83.70	94.00	103.40	114.00	134.40	153.60	174.60	194.00
8	W	116.20	138.40	161.10	183.00	206.00	228.00	273.00	318.00	364.00	408.00
	T	126.70	147.20	167.40	187.00	207.00	227.00	267.00	307.00	347.00	386.00
12	W	180.60	218.00	256.00	293.00	331.00	368.00	444.00	518.00	592.00	668.00
	T	182.70	213.00	243.00	273.00	303.00	332.00	393.00	453.00	513.00	572.00
16	W	229.00	275.00	321.00	367.00	414.00	460.00	552.00	645.00	736.00	830.00
	T	244.00	284.00	324.00	364.00	404.00	444.00	524.00	603.00	684.00	764.00
20	W	299.00	359.00	419.00	479.00	539.00	599.00	718.00	838.00	958.00	1,078.00
	T	305.00	355.00	405.00	455.00	505.00	554.00	655.00	755.00	855.00	954.00
24	W	353.00	422.00	492.00	562.00	633.00	702.00	843.00	982.00	1,121.00	1,262.00
	T	366.00	426.00	486.00	546.00	606.00	666.00	785.00	906.00	1,026.00	1,146.00
30	W	398.00	482.00	567.00	652.00	737.00	822.00	991.00	1,162.00	1,130.00	1,500.00
	T	442.00	518.00	592.00	667.00	743.00	817.00	967.00	1,117.00	1,267.00	1,418.00
40	W	442.00	553.00	671.00	788.00	905.00	1,022.00	1,257.00	1,493.00	1,728.00	1,962.00
	T	580.00	680.00	780.00	880.00	980.00	1,080.00	1,280.00	1,480.00	1,679.00	1,880.00
50	W	511.00	656.00	800.00	945.00	1,090.00	1,235.00	1,525.00	1,814.00	2,100.00	2,390.00
	T	713.00	838.00	962.00	1,087.00	1,212.00	1,338.00	1,588.00	1,837.00	2,090.00	2,340.00
60	W	584.00	740.00	914.00	1,089.00	1,263.00	1,438.00	1,786.00	2,140.00	2,490.00	2,840.00
	T	840.00	990.00	1,140.00	1,290.00	1,440.00	1,590.00	1,890.00	2,190.00	2,490.00	2,790.00
70	W	688.00	856.00	1,057.00	1,257.00	1,458.00	1,658.00	2,060.00	2,460.00	2,870.00	3,270.00
	T	963.00	1,138.00	1,312.00	1,478.00	1,662.00	1,837.00	2,190.00	2,540.00	2,890.00	3,240.00
80	W	786.00	936.00	1,103.00	1,332.00	1,561.00	1,790.00	2,250.00	2,710.00	3,170.00	3,630.00
	T	1,080.00	1,280.00	1,480.00	1,680.00	1,880.00	2,080.00	2,480.00	2,880.00	3,280.00	3,680.00
90	W	884.00	1,053.00	1,242.00	1,499.00	1,757.00	2,010.00	2,530.00	3,050.00	3,560.00	4,080.00
	T	1,193.00	1,418.00	1,643.00	1,867.00	2,090.00	2,320.00	2,770.00	3,220.00	3,670.00	4,120.00
100	W	953.00	1,140.00	1,328.00	1,543.00	1,828.00	2,110.00	2,690.00	3,260.00	3,830.00	4,410.00
	T	1,300.00	1,550.00	1,800.00	2,050.00	2,300.00	2,550.00	3,050.00	3,550.00	4,050.00	4,550.00
120	W	1,143.00	1,368.00	1,593.00	1,851.00	2,195.00	2,540.00	3,230.00	3,910.00	4,600.00	5,290.00
	T	1,500.00	1,800.00	2,100.00	2,400.00	2,700.00	3,000.00	3,600.00	4,200.00	4,800.00	5,400.00
150	W	1,297.00	1,562.00	1,827.00	2,092.00	2,405.00	2,830.00	3,670.00	4,520.00	5,560.00	6,210.00
	T	1,725.00	2,100.00	2,478.00	2,850.00	3,230.00	3,600.00	4,350.00	5,100.00	5,850.00	6,600.00

Table B-2 Wheeled- and Tracked-Vehicle Moment (kip-feet) (cont.)

Class	Wheeled/ Tracked	Span Length (feet)									
		110	120	130	140	150	160	170	180	190	200
4	W	233	254	278	270	321	346	367	389	414	448
	T	213	233	255	274	294	314	333	353	391	428
8	W	453	499	543	588	633	678	724	767	813	880
	T	427	468	507	546	588	627	666	706	775	852
12	W	744	818	892	969	1,044	1,117	1,193	1,267	1,341	1,416
	T	634	694	754	812	873	934	993	1,051	1,136	1,248
16	W	922	1,015	1,108	1,198	1,293	1,386	1,476	1,570	1,661	1,752
	T	845	924	1,004	1,084	1,164	1,245	1,323	1,404	1,516	1,664
20	W	1,199	1,318	1,438	1,557	1,677	1,798	1,918	2,040	2,160	2,280
	T	1,054	1,154	1,256	1,355	1,455	1,555	1,656	1,753	1,896	2,080
24	W	1,401	1,543	1,682	1,823	1,962	2,100	2,240	2,380	2,520	2,660
	T	1,265	1,385	1,505	1,627	1,746	1,866	1,986	2,110	2,280	2,500
30	W	1,670	1,841	2,010	2,180	2,350	2,520	2,690	2,860	3,030	3,200
	T	1,566	1,718	1,867	2,020	2,170	2,310	2,470	2,620	2,790	3,070
40	W	2,200	2,430	2,670	2,900	3,140	3,370	3,610	3,840	4,080	4,310
	T	2,080	2,280	2,480	2,680	2,880	3,080	3,280	3,480	3,680	4,050
50	W	2,680	2,970	3,260	3,550	3,840	4,130	4,420	4,710	5,000	5,290
	T	2,590	2,840	3,090	3,340	3,590	3,840	4,090	4,340	4,590	5,020
60	W	3,190	3,540	3,880	4,230	4,580	4,930	5,280	5,630	5,990	6,330
	T	3,090	3,390	3,690	4,000	4,290	4,590	4,890	5,190	5,490	5,970
70	W	3,670	4,070	4,470	4,880	5,280	5,680	6,080	6,490	6,890	7,290
	T	3,590	3,940	4,290	4,640	4,990	5,340	5,690	6,040	6,390	6,900
80	W	4,090	4,550	5,010	5,460	5,930	6,380	6,840	7,300	7,760	8,820
	T	4,080	4,480	4,880	5,280	5,680	6,080	6,480	6,880	7,280	7,810
90	W	4,600	5,110	5,630	6,150	6,670	7,180	7,700	8,220	8,730	9,250
	T	4,570	5,020	5,470	5,920	6,370	6,820	7,270	7,720	8,170	8,700
100	W	4,980	5,560	6,130	6,710	7,280	7,860	8,430	9,000	9,580	10,160
	T	5,050	5,550	6,050	6,550	7,050	7,550	8,050	8,550	9,050	9,570
120	W	5,980	6,670	7,360	8,050	8,740	9,430	10,120	10,810	11,500	12,180
	T	6,000	6,600	7,200	7,800	8,400	9,000	9,600	10,200	10,800	11,400
150	W	7,060	7,910	8,760	9,600	10,450	11,300	12,150	13,000	13,850	14,700
	T	7,350	8,100	8,850	9,600	10,350	11,100	11,850	12,600	13,350	14,100

Table B-2 Wheeled- and Tracked-Vehicle Moment (kip-feet) (cont.)

Class	Wheeled/ Tracked	Span Length (feet)									
		210	220	230	240	250	260	270	280	290	300
4	W	491	532	579	619	665	733	799	868	934	1,002
	T	466	502	538	586	645	707	767	823	887	948
8	W	966	1,052	1,136	1,224	1,310	1,414	1,550	1,686	1,821	1,956
	T	924	1,003	1,076	1,162	1,285	1,404	1,523	1,641	1,763	1,884
12	W	1,491	1,593	1,734	1,877	2,020	2,160	2,310	2,450	2,660	2,890
	T	1,361	1,474	1,587	1,704	1,855	2,040	2,220	2,400	2,580	2,750
16	W	1,848	1,958	2,130	2,390	2,490	2,660	2,840	3,020	3,290	3,570
	T	1,814	1,967	2,120	2,270	2,480	2,710	2,950	3,200	3,430	3,680
20	W	2,400	2,540	2,770	3,000	3,230	3,460	3,690	3,920	4,270	4,630
	T	2,270	2,460	2,650	2,840	3,100	3,400	3,690	3,990	4,290	4,600
24	W	2,800	2,970	3,240	3,500	3,700	4,040	4,310	4,580	4,990	5,410
	T	2,720	2,950	3,170	3,400	3,720	4,070	4,430	4,790	5,160	5,510
30	W	3,370	3,590	3,910	4,240	4,570	4,890	5,220	5,550	6,020	6,530
	T	3,350	3,630	3,910	4,200	4,510	4,960	5,410	5,860	6,310	6,760
40	W	4,550	4,780	5,140	5,590	6,040	6,490	6,940	7,400	7,850	8,310
	T	4,430	4,800	5,180	5,560	5,940	6,520	7,120	7,720	8,320	8,920
50	W	5,580	5,870	6,370	6,930	7,480	8,030	8,590	9,150	9,710	10,270
	T	5,490	5,950	6,430	6,900	7,380	8,040	8,790	9,540	10,290	11,040
60	W	6,680	7,030	7,410	8,070	8,740	9,410	10,050	10,760	11,430	12,110
	T	6,530	7,090	7,650	8,220	8,800	9,510	10,410	11,310	12,210	13,110
70	W	7,690	8,100	8,500	9,260	10,030	10,800	11,570	12,350	13,130	13,910
	T	7,550	8,200	8,860	9,530	10,200	10,940	11,990	13,040	14,090	15,140
80	W	8,680	9,140	9,600	10,180	11,060	11,940	12,830	13,720	14,610	15,500
	T	8,550	9,300	10,060	10,810	11,580	12,340	13,520	14,720	15,920	17,120
90	W	9,770	10,290	10,810	11,450	12,450	13,440	14,430	15,440	16,440	17,440
	T	9,530	10,380	11,220	12,080	12,940	13,800	15,010	16,360	17,710	19,060
100	W	10,730	11,300	11,880	12,450	13,480	14,580	15,690	16,800	17,910	19,030
	T	10,500	11,440	12,380	13,330	14,280	15,230	16,450	17,950	19,450	21,000
120	W	12,870	13,570	14,260	14,940	16,170	17,490	18,820	20,200	21,500	22,800
	T	12,380	13,500	14,630	15,760	16,910	18,050	19,200	21,000	22,800	24,600
150	W	15,550	16,400	17,250	18,100	19,300	20,900	22,500	24,200	25,800	27,500
	T	14,910	16,320	17,720	19,140	20,600	22,000	23,400	24,700	27,200	29,400

Table B-3 Wheeled- and Tracked-Vehicle Shear (tons)

Class	Wheeled/ Tracked	Span Length (feet)									
		4	6	8	10	12	14	16	18	20	25
4	W	2.50	2.50	2.63	2.80	2.92	3.14	3.31	3.44	3.55	3.74
	T	1.33	2.00	2.50	2.80	3.00	3.14	3.25	3.33	3.40	3.52
8	W	5.50	5.50	5.50	5.50	5.50	5.50	5.63	6.00	6.30	6.84
	T	2.46	3.69	4.75	5.40	5.83	6.14	6.38	6.56	6.70	6.96
12	W	8.00	8.00	8.00	8.00	8.33	8.57	9.13	9.56	9.90	10.52
	T	2.67	4.00	5.33	6.60	7.50	8.14	8.62	9.00	9.30	9.84
16	W	10.00	10.00	10.00	10.40	10.83	11.14	11.75	12.22	12.60	13.28
	T	3.56	5.33	7.11	8.80	10.00	10.86	11.50	12.00	12.40	13.12
20	W	11.00	11.33	12.75	13.60	14.17	14.57	15.38	16.00	16.50	17.40
	T	4.44	6.67	8.89	11.00	12.50	13.57	14.38	15.00	15.50	16.40
24	W	12.00	13.33	15.00	16.00	16.67	17.14	18.13	18.89	19.50	20.60
	T	5.53	8.00	10.67	13.20	15.00	16.28	17.25	18.00	18.60	19.68
30	W	13.50	14.67	16.50	17.60	18.33	18.86	20.00	20.89	21.60	22.88
	T	5.46	8.18	10.91	13.64	16.25	18.22	19.69	20.83	21.75	23.40
40	W	17.00	17.33	19.50	20.80	21.67	22.29	22.75	23.89	24.80	26.72
	T	6.67	10.00	13.33	16.67	20.00	22.86	25.00	26.67	28.00	30.40
50	W	20.00	20.00	22.50	24.00	25.00	25.71	26.25	27.56	28.60	31.60
	T	7.69	11.54	15.38	19.23	23.08	26.78	29.69	31.94	33.75	37.00
60	W	23.00	23.00	24.75	27.00	28.50	29.57	30.38	31.44	32.70	35.52
	T	8.57	12.86	17.14	21.43	25.72	30.00	33.75	36.67	39.00	43.20
70	W	25.50	25.50	28.88	31.50	33.25	34.50	35.44	36.75	38.33	41.16
	T	9.33	14.00	18.67	23.33	28.00	32.67	37.19	40.83	43.75	49.00
80	W	28.00	28.00	33.00	36.00	38.00	39.43	40.50	42.00	43.80	47.04
	T	10.00	15.00	20.00	25.00	30.00	35.00	40.00	44.44	48.00	54.40
90	W	30.00	31.50	37.13	40.50	42.75	44.36	45.56	47.25	49.28	52.92
	T	10.59	15.88	21.18	26.47	31.76	37.06	42.35	47.50	51.75	59.40
100	W	32.00	32.00	37.50	42.00	45.00	47.14	48.75	50.00	52.50	57.00
	T	11.11	16.67	22.22	27.78	33.33	38.89	44.44	50.00	55.00	64.00
120	W	36.00	36.00	45.00	50.40	54.00	56.57	58.50	60.00	63.00	68.40
	T	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	60.00	72.00
150	W	42.00	42.00	47.25	54.60	59.50	63.00	65.63	67.67	70.40	77.52
	T	12.50	18.75	25.00	31.25	37.50	43.75	50.00	56.25	62.50	78.00

Table B-3 Wheeled- and Tracked-Vehicle Shear (tons) (cont.)

Class	Wheeled/ Tracked	Span Length (feet)										
		30	35	40	45	50	55	60	70	80	90	100
4	W	3.87	3.96	4.03	4.08	4.12	4.15	4.18	4.23	4.26	4.29	4.31
	T	3.60	3.66	3.70	3.73	3.76	3.78	3.80	3.83	3.85	3.87	3.88
8	W	7.20	7.46	7.65	7.80	7.92	8.02	8.10	8.23	8.33	8.40	8.46
	T	7.13	7.26	7.35	7.42	7.48	7.53	7.57	7.63	7.68	7.71	7.74
12	W	10.93	11.23	11.45	11.62	11.76	11.87	12.13	12.54	12.85	13.09	13.28
	T	10.20	10.46	10.65	10.80	10.92	11.02	11.10	11.23	11.32	11.40	11.46
16	W	13.73	14.06	14.30	14.49	14.64	14.76	14.87	15.34	15.74	16.04	16.29
	T	13.60	13.94	14.20	14.40	14.56	14.69	14.80	14.97	15.10	15.20	15.28
20	W	18.00	18.43	18.75	19.00	19.20	19.36	19.50	19.97	20.48	20.87	21.18
	T	17.00	17.43	17.75	18.00	18.20	18.36	18.50	18.72	18.88	19.00	19.10
24	W	21.33	21.86	22.25	22.56	22.80	23.00	23.17	23.46	24.03	24.47	24.82
	T	20.40	20.92	21.30	21.60	21.84	22.04	22.20	22.46	22.65	22.80	22.92
30	W	23.73	24.34	24.80	25.16	25.60	26.36	27.00	28.00	28.75	29.33	29.80
	T	24.50	25.28	25.88	26.33	26.70	27.00	27.25	27.64	27.94	28.17	28.35
40	W	28.93	30.51	31.70	32.62	33.36	34.42	35.47	37.11	38.35	39.31	40.08
	T	32.00	33.14	34.00	34.67	35.20	35.64	36.00	36.57	37.00	37.33	37.60
50	W	34.67	36.86	38.50	40.31	42.08	43.53	44.73	46.63	48.05	49.16	50.04
	T	39.17	40.72	41.88	42.78	43.50	44.09	44.58	45.36	45.94	46.39	46.75
60	W	39.93	42.09	45.45	47.29	48.76	49.96	51.43	54.09	56.08	57.62	58.86
	T	46.00	48.00	49.50	50.67	51.60	52.36	53.00	54.00	54.75	55.33	55.60
70	W	45.97	49.40	51.98	53.98	55.58	56.89	58.22	61.40	63.79	65.64	67.13
	T	52.50	55.00	56.88	58.33	59.50	60.46	61.25	62.50	63.44	64.17	64.75
80	W	49.20	53.26	56.60	59.20	61.28	62.98	64.40	66.63	69.70	72.18	74.16
	T	58.67	61.72	64.00	65.78	67.20	68.36	69.33	70.86	72.00	72.89	73.60
90	W	55.35	59.91	63.68	66.60	68.94	70.85	72.45	74.96	78.41	81.20	83.43
	T	64.50	68.14	70.88	73.00	74.70	76.09	77.25	79.07	80.44	81.50	82.35
100	W	60.02	64.57	69.00	72.44	75.20	77.45	79.33	82.29	84.69	88.06	90.75
	T	70.00	74.28	77.50	80.00	82.00	83.64	85.00	87.14	88.75	90.00	91.00
120	W	72.02	77.49	82.80	86.93	90.24	92.94	95.20	98.74	101.60	105.70	108.90
	T	80.00	85.71	90.00	93.33	96.00	98.18	100.00	102.90	105.00	106.70	108.00
150	W	82.98	85.66	89.45	95.76	101.20	105.40	109.00	114.70	121.60	127.00	131.30
	T	90.00	98.57	105.00	110.00	114.00	117.30	120.00	124.30	127.50	130.00	132.00

Table B-3 Wheeled- and Tracked-Vehicle Shear (tons) (cont.)

Class	Wheeled/ Tracked	Span Length (feet)									
		110	120	130	140	150	160	170	180	190	200
4	W	4.33	4.52	4.83	5.13	5.39	5.61	5.81	5.99	6.15	6.29
	T	3.94	4.27	4.56	4.80	5.01	5.20	5.36	5.51	5.64	5.76
8	W	8.51	8.75	9.28	9.90	10.44	10.91	11.33	11.70	12.03	12.33
	T	7.83	8.47	9.05	9.54	9.97	10.35	10.68	10.98	11.24	11.48
12	W	13.44	13.57	13.77	14.21	15.13	16.04	16.86	17.59	18.24	18.83
	T	11.52	12.20	13.10	13.89	14.56	15.15	15.67	16.13	16.55	16.92
16	W	16.50	16.65	16.89	17.41	18.55	19.67	20.69	21.59	22.41	23.14
	T	15.35	16.27	17.48	18.51	19.41	20.20	20.89	21.51	22.06	22.56
20	W	21.44	21.65	21.95	22.63	24.12	25.58	26.89	28.07	29.12	30.06
	T	19.19	20.33	21.85	23.14	24.27	25.25	26.12	26.89	27.58	28.20
24	W	25.11	25.35	25.71	26.51	28.28	29.98	31.51	32.87	33.67	35.18
	T	23.03	24.40	26.22	27.77	29.12	30.30	31.34	32.27	33.09	33.84
30	W	30.18	30.50	30.95	31.91	33.92	35.98	37.36	39.53	41.03	42.38
	T	28.50	29.55	31.85	33.86	35.60	37.13	38.47	39.67	40.74	41.70
40	W	40.71	41.23	41.68	42.86	44.24	46.75	49.36	51.84	54.06	56.06
	T	37.82	38.89	41.85	44.57	46.93	49.00	50.82	52.44	53.89	55.20
50	W	50.76	51.37	51.88	53.46	55.29	58.40	61.60	64.62	67.33	69.76
	T	47.04	48.08	51.54	55.00	58.00	60.63	62.94	65.00	66.84	68.50
60	W	59.87	60.71	61.43	62.41	63.57	67.18	70.99	74.74	78.17	81.26
	T	56.18	57.14	60.92	65.14	68.80	72.00	74.82	77.33	79.58	81.60
70	W	68.35	69.36	70.22	71.35	73.88	76.65	80.99	85.31	89.31	92.89
	T	65.23	66.11	70.00	75.00	79.33	83.13	86.47	89.44	92.10	94.50
80	W	75.78	77.13	78.28	79.26	81.71	84.35	87.95	92.62	97.43	101.80
	T	74.18	75.00	78.85	84.57	89.60	93.89	97.77	101.20	104.30	107.10
90	W	85.25	86.77	88.06	89.16	91.92	94.89	98.85	104.20	109.60	114.50
	T	83.04	83.82	87.56	93.86	99.60	104.60	109.10	113.00	116.50	119.70
100	W	92.95	94.79	96.35	97.68	100.00	103.50	106.90	112.20	117.90	123.50
	T	91.82	92.59	96.15	102.90	109.30	115.00	120.00	124.40	128.40	132.00
120	W	111.50	113.80	115.60	117.20	120.00	124.20	128.20	134.60	141.50	148.20
	T	109.10	110.00	113.10	120.00	128.00	135.00	141.20	146.70	151.60	156.00
150	W	134.80	137.70	140.20	142.30	144.80	149.80	154.80	160.30	168.20	176.30
	T	133.60	135.00	137.00	142.90	152.00	161.30	169.40	176.70	183.20	189.00

Table B-3 Wheeled- and Tracked-Vehicle Shear (tons) (cont.)

Class	Wheeled/ Tracked	Span Length (feet)									
		210	220	230	240	250	260	270	280	290	300
4	W	6.42	6.54	6.70	6.96	7.22	7.47	7.69	7.90	8.09	8.27
	T	5.87	6.05	6.31	6.55	6.77	6.97	7.16	7.33	7.49	7.64
8	W	12.60	12.84	13.10	13.53	14.04	14.54	15.00	15.43	15.83	16.20
	T	11.70	12.03	12.55	13.02	13.46	13.87	14.24	14.59	14.92	15.22
12	W	19.36	19.85	20.29	20.69	21.06	21.50	22.15	22.91	23.67	24.38
	T	17.26	17.58	18.23	18.97	19.66	20.28	20.87	21.41	21.91	22.38
16	W	23.80	24.40	24.94	25.45	25.91	26.43	27.22	28.16	29.10	29.98
	T	23.01	23.43	24.31	25.30	26.21	27.05	27.82	28.54	29.21	29.84
20	W	30.91	31.69	32.40	33.05	33.65	34.32	35.36	36.58	37.80	38.94
	T	28.76	29.29	30.39	31.62	32.76	33.81	34.78	35.68	36.52	37.30
24	W	36.17	37.07	37.90	38.65	39.34	40.14	41.36	42.79	44.21	45.54
	T	34.51	35.15	36.47	37.95	39.31	40.57	41.73	42.81	43.82	44.76
30	W	43.60	44.71	45.72	46.65	47.50	48.48	49.91	51.60	53.34	54.96
	T	42.57	43.36	44.47	46.31	48.06	49.67	51.17	52.55	53.84	55.05
40	W	57.87	59.51	61.01	62.38	63.65	64.82	66.21	67.70	69.81	72.04
	T	56.38	57.45	58.70	61.00	63.36	65.54	67.56	69.43	71.17	72.80
50	W	71.96	73.96	75.79	77.47	79.01	80.43	82.19	84.11	86.73	89.48
	T	70.00	71.36	72.74	75.31	78.30	81.06	83.61	85.98	88.19	90.25
60	W	84.06	86.60	88.92	91.05	93.01	94.82	96.49	98.60	100.92	103.87
	T	83.43	85.09	86.65	89.29	92.88	96.23	99.33	102.20	104.90	107.40
70	W	96.13	99.08	101.80	104.20	106.50	108.60	110.60	113.00	115.60	118.90
	T	96.67	98.64	100.40	103.10	107.10	111.10	114.70	118.10	121.30	124.30
80	W	105.70	109.20	112.50	115.50	118.20	120.70	123.10	125.30	128.10	131.00
	T	109.60	112.00	114.10	116.70	121.00	125.50	129.80	133.70	137.40	140.80
90	W	118.90	122.90	126.60	129.90	133.00	135.80	138.50	140.90	144.10	147.40
	T	122.60	125.20	127.60	130.10	134.50	139.70	144.50	149.00	153.20	157.10
100	W	128.60	133.20	137.40	141.30	144.80	148.10	151.10	153.90	156.80	160.60
	T	135.20	138.20	140.90	143.50	147.70	153.50	158.90	163.90	168.60	173.00
120	W	154.30	159.80	164.90	169.50	173.80	177.70	181.40	184.70	188.20	192.70
	T	160.00	163.60	167.00	170.00	174.00	180.00	186.70	192.90	198.60	204.00
150	W	184.10	191.20	197.77	203.60	209.10	214.40	218.80	223.10	227.10	231.50
	T	194.30	199.10	203.50	207.50	211.30	216.30	223.40	231.40	239.00	246.00

Figure B-1 Wheeled Bending Moment

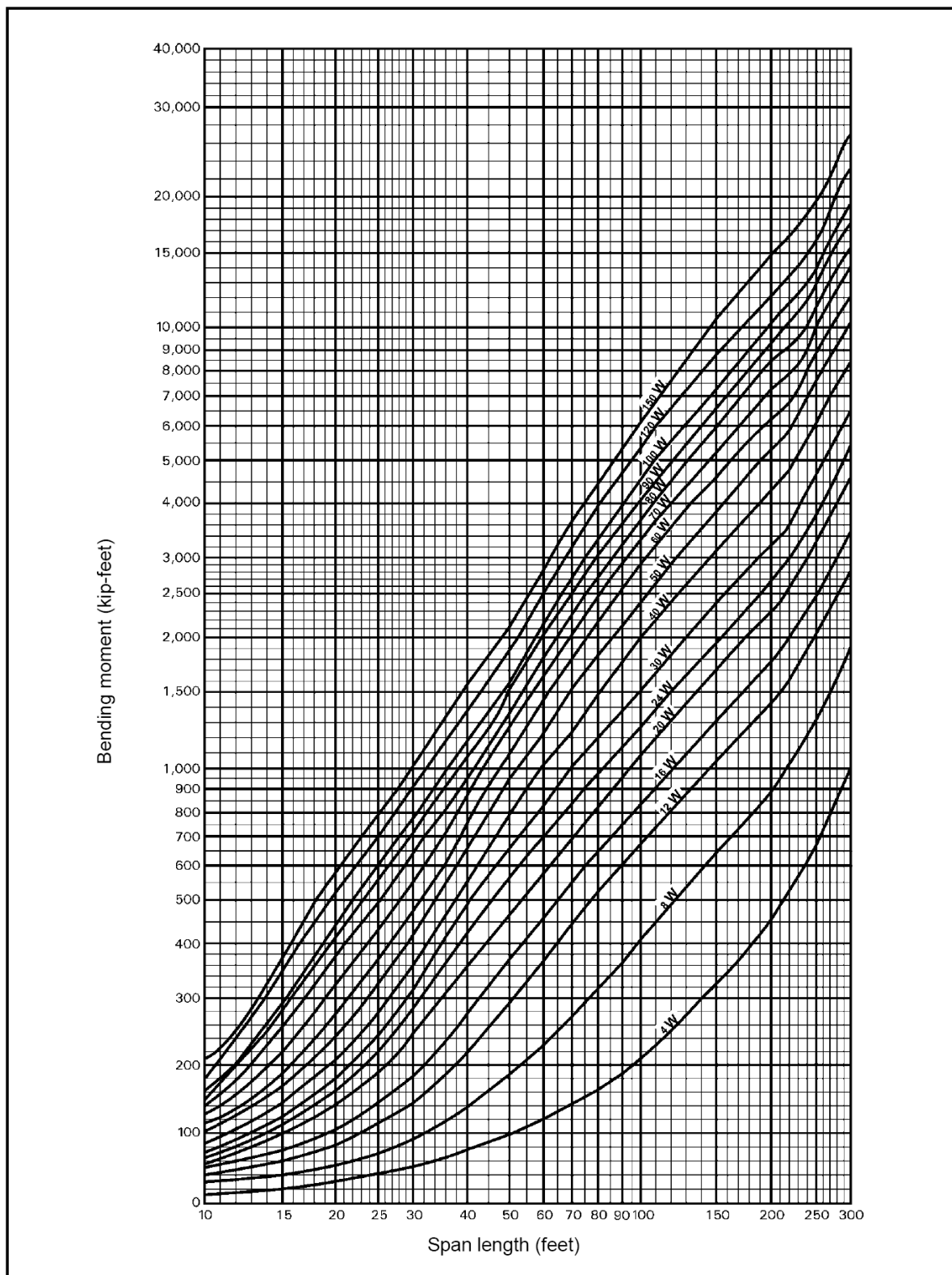


Figure B-2 Tracked Bending Moment

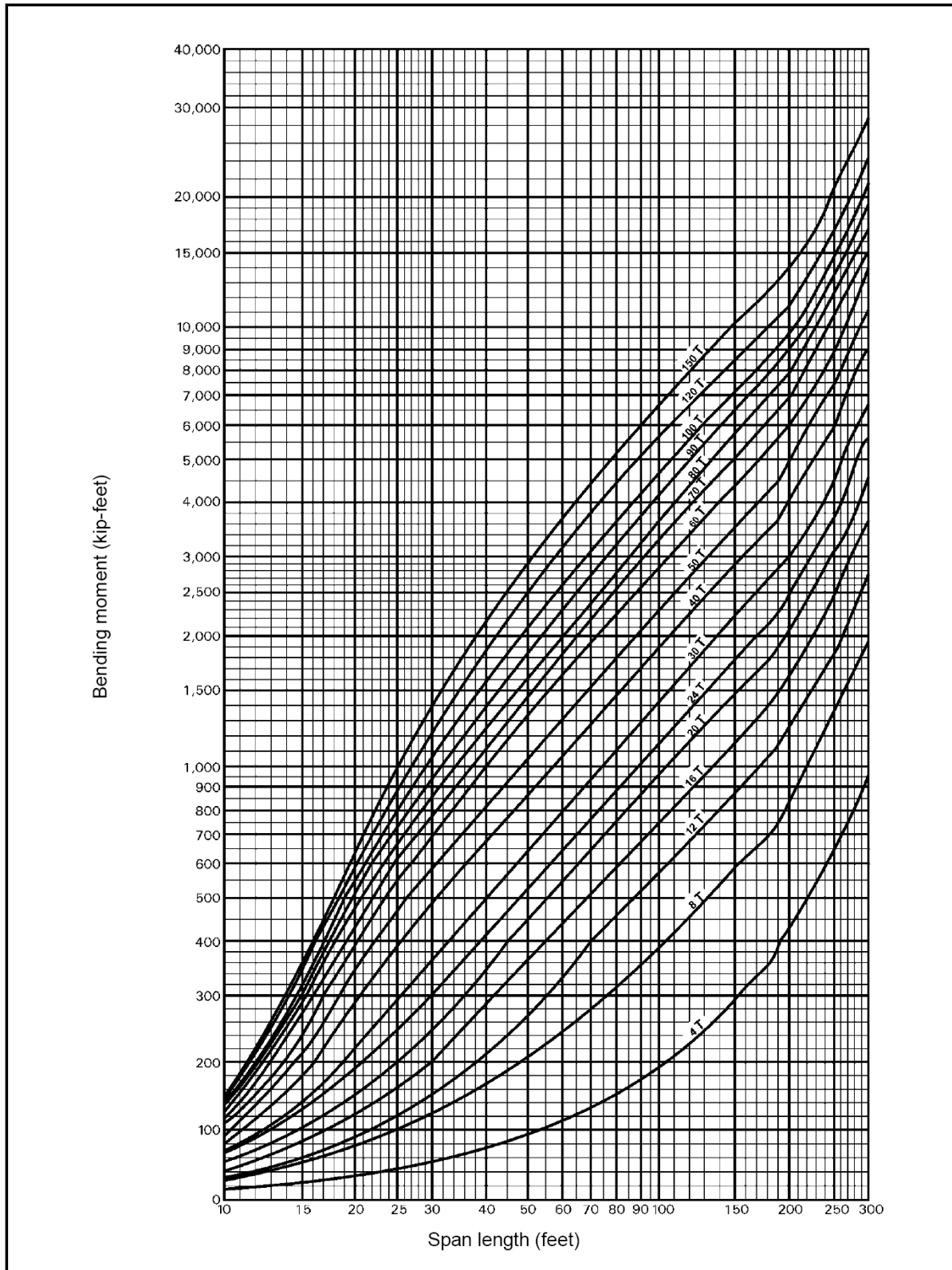


Figure B-3 Wheeled Shear

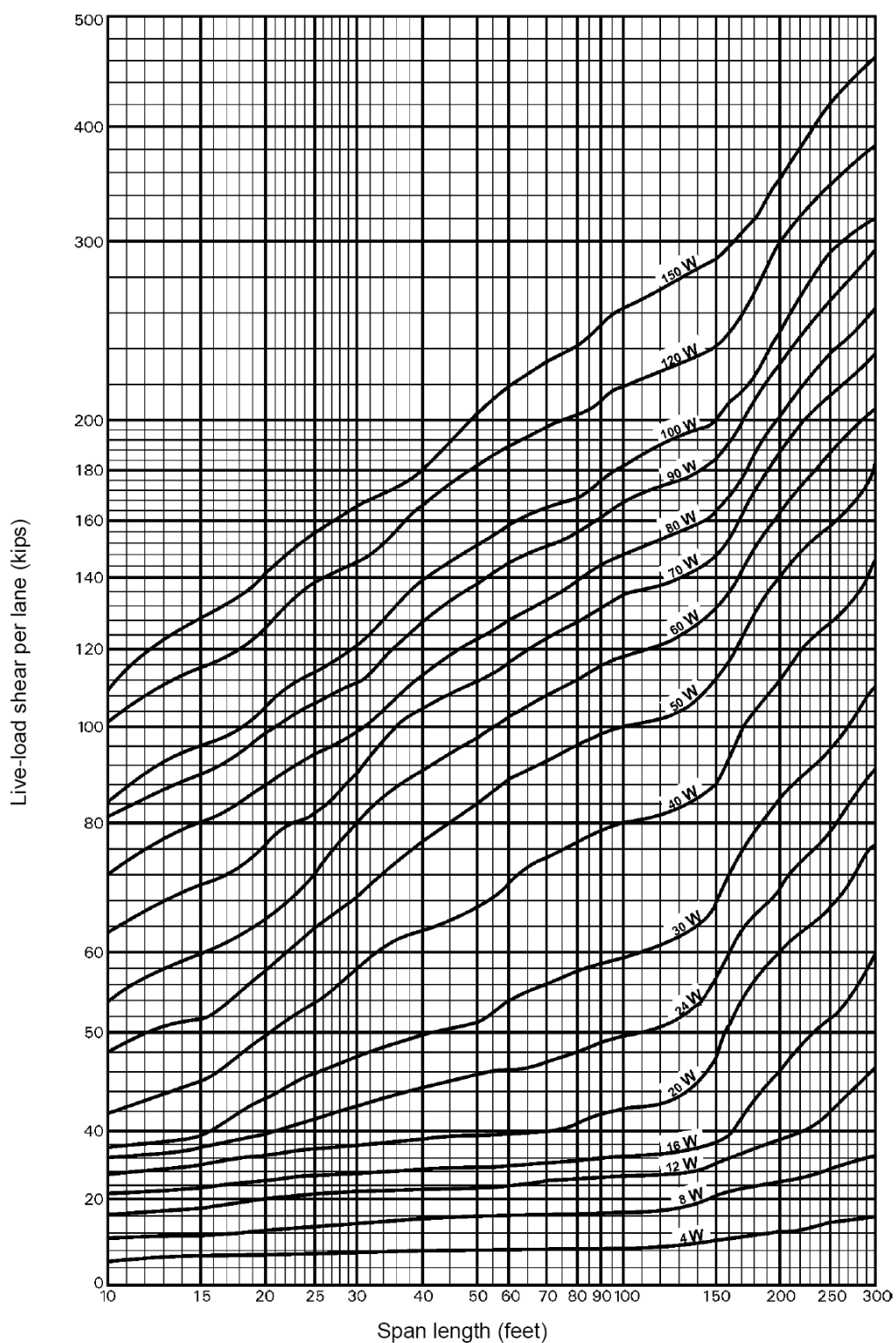
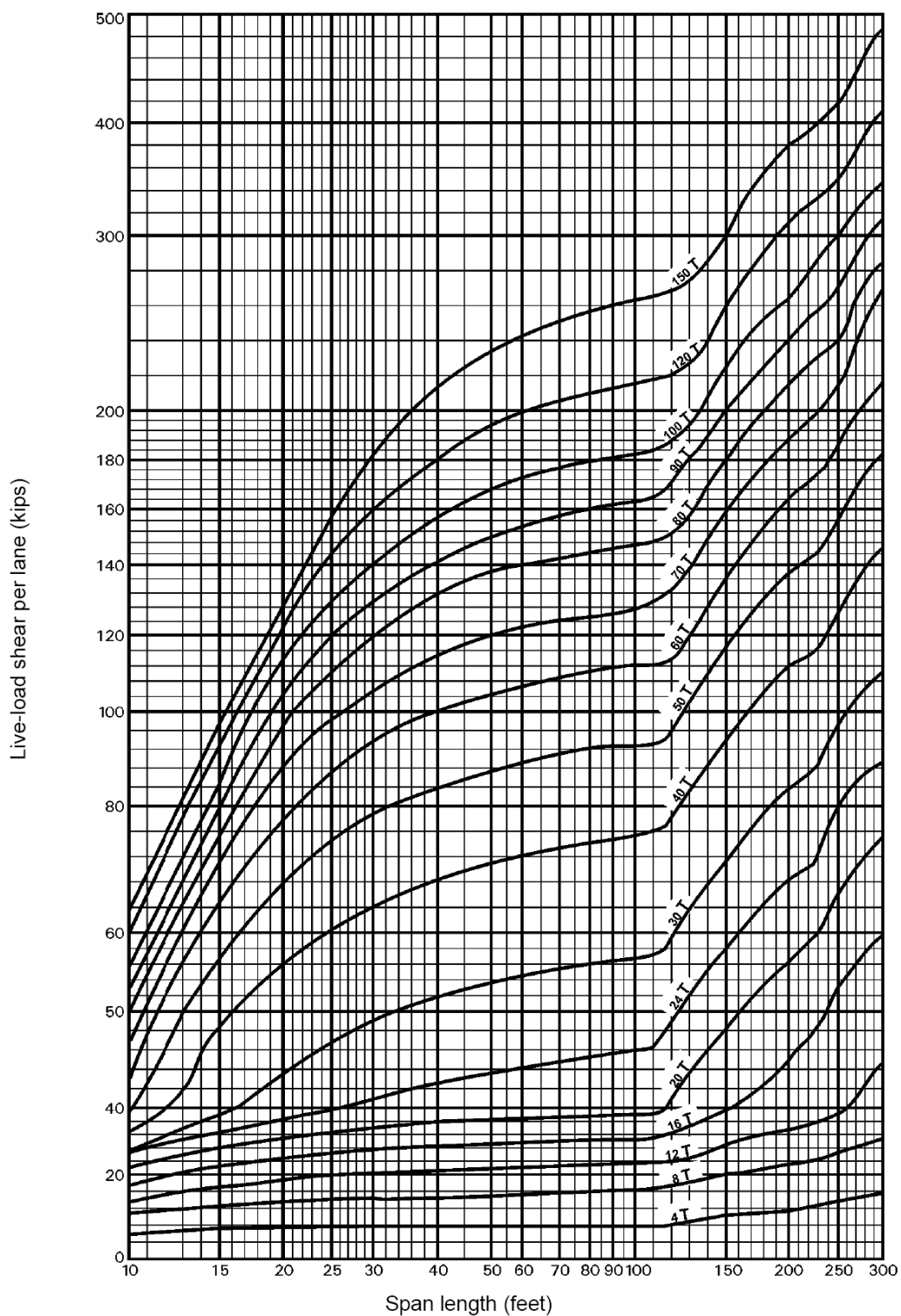


Figure B-4 Tracked Shear



B-2 CRITERIA FOR NATIONAL BRIDGE PROGRAM MANAGER TO ALTER INSPECTION INTERVAL.

The National Bridge Program Manager may alter the routine inspection interval for NBI highway bridges per the following criteria and procedures. It should be noted that the routine inspection interval may be either increased or decreased from the standard 24-month interval, although FHWA approval is only required for a decreased inspection interval.

Inspection intervals must be evaluated and, if necessary, adjusted after each inspection. Regardless of the interval selected for routine inspection, individual bridge members may require differing types and intervals of inspection (e.g., FCMs, distressed members, underwater members).

B-2.1 Procedure for FHWA Approval of Increased Inspection Intervals.

The National Bridge Program Manager will submit a request to increase the routine inspection interval to more than 24 months to the FHWA Eastern Federal Lands Highway Division (EFLHD). The FHWA will send approval of acceptance to the National Bridge Program Manager. Submissions to the FHWA for increased inspection intervals must contain the following information, at a minimum:

- The criteria used in establishing the interval between inspections, outlined above
- A discussion of failure experience, maintenance history, and latest inspection findings for the group of structures identified
- The proposed inspection interval

A template for requesting an extension of the inspection interval to 48 months for Service bridges that meet specific criteria is provided in paragraph B-2.2.

B-2.2 Template for Requesting Increasing Bridge Inspection Interval to Four Years for Qualifying Bridges.

Mr. Hratch Pakhchanian, P.E. (or current EFLHD Bridge Engineer)
Bridge Engineer
Eastern Federal Lands Highway Division
21400 Ridgetop Circle, #341
Sterling, VA 20166
hratch.pakhchanian@dot.gov
(703) 404-6246

Subject: Submittal of Bureau of Reclamation's Criteria for Varying Bridge Inspection Frequency from Two-Year to a Four-Year Inspection Frequency

Dear Mr. Pakhchanian:

In accordance to the National Bridge Inspection Standards, Code of Federal Regulations, 23 Highways - Part 650, Subpart C, and Technical Advisory 5140.2 1 dated September 16, 1988, we hereby submit our application for increasing the two-year inspection interval for some of our structures to four years.

See Attachment A for our criteria for increasing the bridge inspection interval.

Should you have any questions regarding these criteria, please contact **<insert name>** at **<insert phone number>**, or email at **<insert email address>**.

Sincerely,

<insert signature block>

Attachment A

cc: Yohannes Mesfin (or current EFLHD Federal Agency Bridge Safety Engineer)
Federal Agency Bridge Safety Engineer
Eastern Federal Lands Highway Division
21400 Ridgetop Circle #341
Sterling, VA 20166
Yohannes.Mesfin@dot.gov
(703) 404-6256

ATTACHMENT A:

CRITERIA FOR INCREASING *<insert Military Department here>* BRIDGE
INSPECTION INTERVAL FROM TWO-YEAR TO A FOUR-YEAR INSPECTION
FREQUENCY

The *<insert Military Department here>* policy for increasing routine inspections inspection interval from the two-year requirement to four years on selected bridges is based on the general guidelines contained in *Federal Highway Administration (FHWA) Technical Advisory, Revisions to the National Bridge Inspection Standards (NBIS), TA 5140.21*. The *<insert Military Department here>* assessment is that the bridges selected for a decrease in routine inspection interval from the typical two-year inspection interval are in good to very good condition, will adhere to FHWA Technical Advisory 5140.21 Guidelines, and in addition meet the following criteria:

All of the following criteria must be met before a bridge will be considered for an inspection interval greater than two years. Bridges eligible for increasing inspection interval from two years to a maximum of four years are:

Bridges with condition ratings of 6 or greater. *NBI 58, 59, 60, 61, and 62 ≥ 6 .*

Bridges that have inventory ratings greater than or equal to the state's legal load. *NBI 66 \geq HS20 (36 tons) or MS18 (32.4 metric tons) or HL-93 with a rating factor ≥ 1.0 .*

Structures with length of maximum span (measured from center to center of bearing points) less than or equal to 100 feet. *NBI 48 \leq 100 feet (30.5 m).*

Structure types with load path redundancy. *NBI 43B = 1, 2, 3, 4, 5, 6, 7, 11, 19.* This rule applies to structures of all material types. No structure with fracture critical details will go on the extended policy, *NBI 92A = N*.

Bridge Roadway Width, Curb to Curb is greater than or equal to 12 feet. *NBI 51 \geq 12.0 feet (3.66 m)*

Any vertical over or under clearances are greater than or equal to 14 feet. *NBI 53 & 54 \geq 14 feet (4.27 m).*

Structure is not susceptible to scour. *NBI 113 > 4 and 113 $\neq 6$.*

New bridge structures or newly rehabilitated structures must have received an inventory inspection and an in-depth inspection one or two years later.

Any bridge considered for inspection intervals longer than two years must have received an in-depth inspection which revealed no major deficiencies.

As a matter of policy, and in accordance with 23 Code of Federal Regulations (CFR) 650, National Bridge Inspection Standards (NBIS), the **<insert Military Department here>** inspects their bridges at two-year intervals and will continue to inspect most of our bridges at two-year intervals. Each **<insert Military Department here>** installation is responsible for inspecting bridges within their boundary; therefore, each Installation Bridge Manager in conjunction with the National Bridge Program Manager will determine which of the bridges located within their jurisdiction are eligible for an increased inspection interval of up to four years. Those structures that do not meet the criteria listed above are not eligible for increasing the inspection interval.

Note: All references to National Bridge Inventory (NBI) items are those defined by FHWA-PD-96-001, *Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges*, dated December 1995.

B-3 POINT OF CONTACT INFORMATION FOR MILITARY DEPARTMENT.

Note: This contact information is valid as of the date of publication for this UFC.

Department of the Army:

Mike Dean
Army Bridge Inspection Program Proponent
OACSIM, ATTN: DAIM-ODF
NC1 Presidential Towers
2511 Jefferson Davis Highway
Arlington, VA 22202
Telephone: 703-601-0703
Email: mike.dean@us.army.mil

Ali A. Achmar
Army Bridge Inspection Program Manager
HQ IMCOM, ATTN: IMPW-E
2509 Dunston Road Building 2007, 3rd Floor
Fort Sam Houston, TX 78234
Telephone: 210-295-0993
BB: 210-426-6872
Email: ali.achmar@us.army.mil

Department of the Navy:

Kevin Haskins, P.E.
Navy Bridge Inspection Program Manager
Naval Facilities and Expeditionary Warfare Center
(NAVFAC EXWC)
720 Kennon St., S.E.
Building 36 Suite 333
Washington Navy Yard, DC 20374-5063
Telephone: 202-433-5083
Email: kevin.l.haskins@navy.mil

Department of the Air Force:

Tracy Coughlin, P.E.
Air Force Civil Engineer Center
139 Barnes Drive, Suite 1
Tyndall AFB, FL 32403
Telephone: 850-283-6801
Email: tracy.coughlin.1@us.af.mil

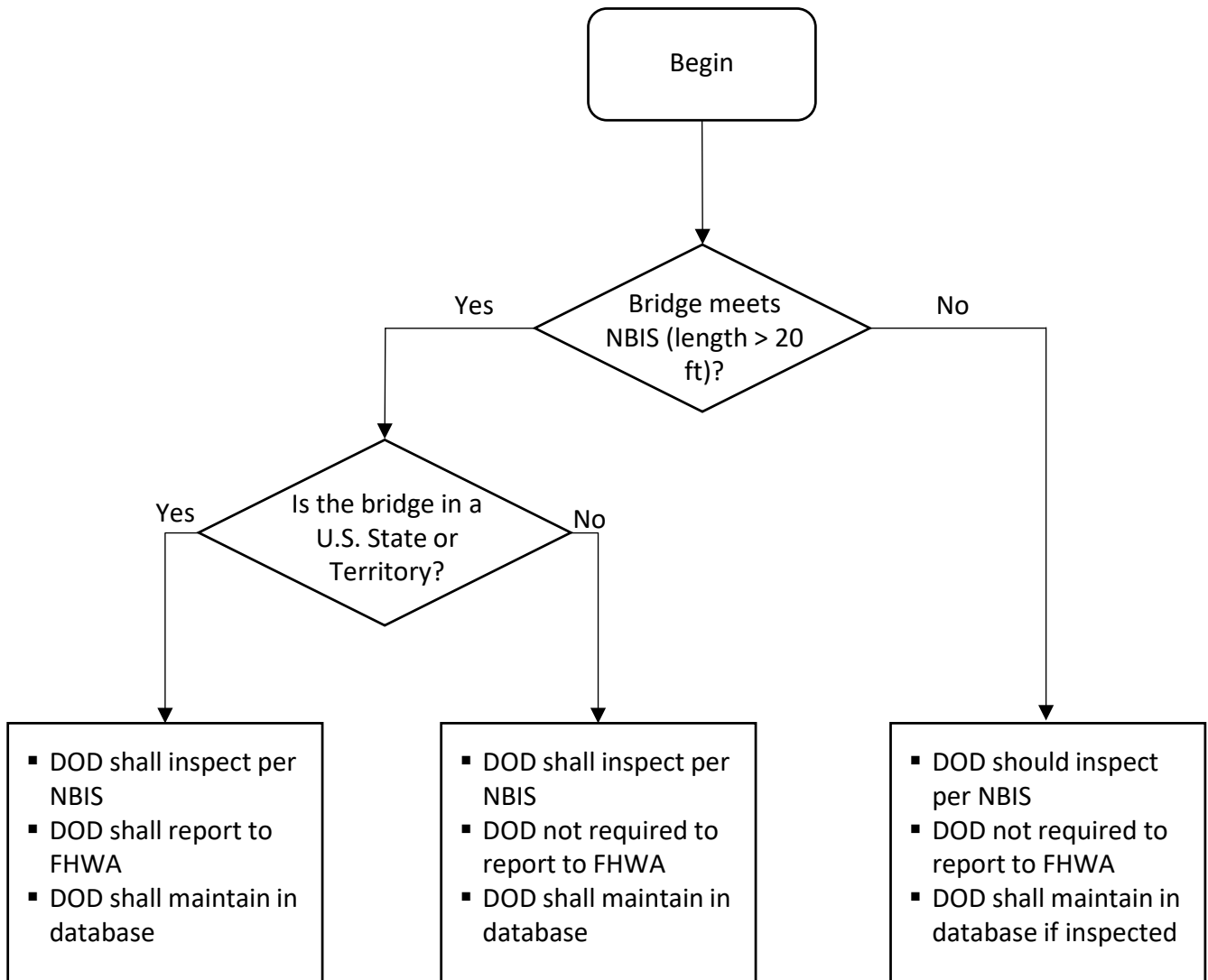
B-4 STATE LEGAL LOAD LIMITS FOR POSTING.

For the most current information on state legal load posting and load rating requirements, the following department of transportation websites should be consulted.

State/District	Agency Name	Website
Alabama	Alabama Department of Transportation (ALDOT)	http://www.dot.state.al.us
Alaska	Alaska Department of Transportation & Public Facilities (ADOT&PF)	http://www.dot.state.ak.us
Arizona	Arizona Department of Transportation (ADOT)	http://www.azdot.gov
Arkansas	Arkansas State Highway and Transportation Department (AHTD)	http://www.arkansashighways.com
California	California Department of Transportation (Caltrans)	http://www.dot.ca.gov
Colorado	Colorado Department of Transportation (CDOT)	https://www.codot.gov
Connecticut	Connecticut Department of Transportation (ConnDOT)	http://www.ct.gov/dot
Delaware	Delaware Department of Transportation (DelDOT)	http://www.deldot.gov
District of Columbia	District Department of Transportation (DDOT)	http://ddot.dc.gov
Florida	Florida Department of Transportation (FDOT)	http://www.dot.state.fl.us
Georgia	Georgia Department of Transportation (GDOT)	http://www.dot.ga.gov
Hawaii	Hawaii Department of Transportation (HDOT)	http://hidot.hawaii.gov
Idaho	Idaho Transportation Department (ITD)	http://itd.idaho.gov
Illinois	Illinois Department of Transportation (IDOT)	http://www.idot.illinois.gov
Indiana	Indiana Department of Transportation (INDOT)	http://www.in.gov/indot
Iowa	Iowa Department of Transportation (IowaDOT)	http://www.iowadot.gov
Kansas	Kansas Department of Transportation (KDOT)	http://www.ksdot.org
Kentucky	Kentucky Transportation Cabinet (KYTC)	http://transportation.ky.gov
Louisiana	Louisiana Department of Transportation & Development (LaDOTD)	http://wwwsp.dotd.la.gov
Maine	Maine Department of Transportation (MaineDOT)	http://maine.gov/mdot
Maryland	Maryland Department of Transportation (MDOT)	http://www.mdot.maryland.gov
Massachusetts	Massachusetts Department of Transportation (MassDOT)	http://www.massdot.state.ma.us
Michigan	Michigan Department of Transportation (MDOT)	http://www.michigan.gov/mdot
Minnesota	Minnesota Department of Transportation (MnDOT)	http://www.dot.state.mn.us
Mississippi	Mississippi Department of Transportation (MDOT)	http://mdot.ms.gov
Missouri	Missouri Department of Transportation (MoDOT)	http://www.modot.org
Montana	Montana Department of Transportation (MDT)	http://www.mdt.mt.gov
Nebraska	Nebraska Department of Roads (NDOR)	http://roads.nebraska.gov/
Nevada	Nevada Department of Transportation (NDOT)	http://www.nevadadot.com
New Hampshire	New Hampshire Department of Transportation (NHDOT)	http://www.nh.gov/dot
New Jersey	New Jersey Department of Transportation (NJDOT)	http://www.state.nj.us/transportation
New Mexico	New Mexico Department of Transportation (NMDOT)	http://dot.state.nm.us
New York	New York State Department of Transportation (NYSDOT)	http://www.dot.ny.gov
North Carolina	North Carolina Department of Transportation (NCDOT)	http://www.ncdot.gov
North Dakota	North Dakota Department of Transportation (NDDOT)	http://www.dot.nd.gov
Ohio	Ohio Department of Transportation (ODOT)	http://www.dot.state.oh.us
Oklahoma	Oklahoma Department of Transportation (ODOT)	http://ok.gov/odot
Oregon	Oregon Department of Transportation (ODOT)	http://www.oregon.gov/ODOT
Pennsylvania	Pennsylvania Department of Transportation (PennDOT)	http://www.penndot.gov
Rhode Island	Rhode Island Department of Transportation (RIDOT)	http://www.dot.ri.gov
South Carolina	South Carolina Department of Transportation (SCDOT)	http://www.dot.state.sc.us
South Dakota	South Dakota Department of Transportation (SDDOT)	http://www.sddot.com
Tennessee	Tennessee Department of Transportation (TDOT)	http://www.tn.gov/tdot
Texas	Texas Department of Transportation (TxDOT)	http://www.txdot.gov
Utah	Utah Department of Transportation (UDOT)	http://www.udot.utah.gov
Vermont	Vermont Agency of Transportation (VTrans)	http://vtrans.vermont.gov
Virginia	Virginia Department of Transportation (VDOT)	http://virginiadot.org
Washington	Washington Department of Transportation (WSDOT)	http://www.wsdot.wa.gov
West Virginia	West Virginia Department of Transportation (WVDOT)	http://www.transportation.wv.gov
Wisconsin	Wisconsin Department of Transportation (WisDOT)	http://wisconsindot.gov
Wyoming	Wyoming Department of Transportation (WYDOT)	http://www.dot.state.wy.us

B-5

SIMPLIFIED HIGHWAY BRIDGE INSPECTION FLOWCHART.



B-6 EXAMPLE FATIGUE-PRONE DETAIL FORM FOR FCM PLAN.

Fatigue Detail Sheet

BRIDGE #: 01-139-AA05-77-001
 LOCATION: CR 577 over Morrison Creek
 INSPECTION DATE(S): December 10, 2014
 FRACTURE CRITICAL MEMBER(S): 3 bent caps at Bents 1 through 3
 CRITICAL AREA: Bottom flange and bottom half of the web plates in positive moment regions,
Top flange and top half of the web plates in negative moment regions,
and the web plates in primary shear regions.

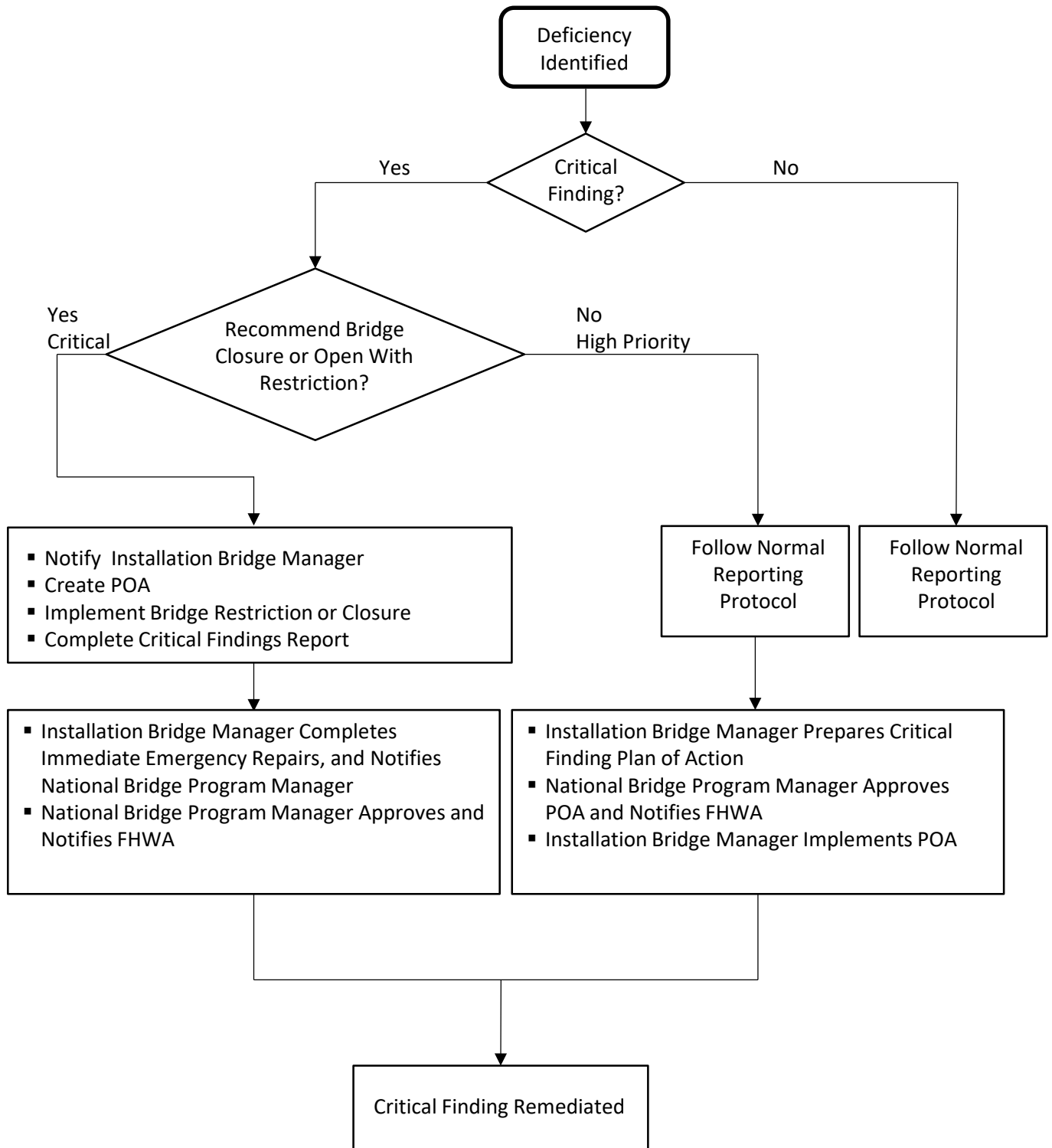
DETAIL DESCRIPTION	FATIGUE CATEGORY	COMMENTS	PHOTO NUMBER(S)
Base metal of steel away from all welds or structural connections	A	Isolated locations with paint failure	7
Web and flange splice weld with weld reinforcement not removed	C	OK	8
Base metal at the toe of transverse connection plate welds	C'	Isolated locations of poor fusion	9, 13
Net section at open holes in member	D	OK	10
Base metal of bent cap flange at errant transverse weld	E	OK	11

(The fatigue-prone details listed above are provided as examples only. The specific fatigue-prone details for the fracture critical bridge to be inspected must be determined and listed as part of the bridge's fracture critical plan.)

B-7 EXAMPLE SCOUR CRITICAL BRIDGE PLAN OF ACTION.

SCOUR CRITICAL BRIDGE - PLAN OF ACTION			
1. GENERAL INFORMATION			
Structure number: _____	City, County, State: _____	Waterway: _____	
Structure name: _____	State highway or facility carried: _____	Owner: _____	
Year built: _____	Year rebuilt: _____	Bridge replacement plans (if scheduled): _____ Anticipated opening date: _____	
Structure type: <input type="checkbox"/> Bridge <input type="checkbox"/> Culvert			
Structure size and description: _____			
Foundations: <input type="checkbox"/> Known, type: _____ Depth: _____ <input type="checkbox"/> Unknown			
Subsurface soil information (check all that apply): <input type="checkbox"/> Non-cohesive <input type="checkbox"/> Cohesive <input type="checkbox"/> Rock			
Bridge ADT: _____	Year/ADT: _____	% Trucks: _____	
Does the bridge provide service to emergency facilities and/or an evacuation route (Y/N)? _____ If so, describe: _____			
2. RESPONSIBILITY FOR POA			
Author(s) of POA (name, title, agency/organization, telephone, pager, email): _____			
Date: _____			
Concurrences on POA (name, title, agency/organization, telephone, pager, email): _____			
POA updated by (name, title, agency, organization): _____ Date of update: _____			
Items update: _____			
POA to be updated every _____ months by (name, title, agency/organization): _____			
Date of next update: _____			
3. SCOUR VULNERABILITY			
a. Current Item 113 Code: <input type="checkbox"/> 3 <input type="checkbox"/> 2 <input type="checkbox"/> 1 Other: _____			
b. Source of Scour Critical Code: <input type="checkbox"/> Observed <input type="checkbox"/> Assessment <input type="checkbox"/> Calculated Other: _____			
c. Scour Evaluation Summary: _____			
d. Scour History: _____			

B-8 FLOW CHART FOR CRITICAL FINDINGS.



B-9 EXAMPLE CRITICAL INSPECTION FINDING REPORT.

<u>CRITICAL INSPECTION FINDING REPORT</u>			
Bridge: _____	Route: _____	Installation: _____	Country: _____
Inspector: _____	Inspection Date: _____	AADT: _____	
Reason for Critical Inspection Finding Report (Be specific about deficiencies, attach photographs): <div style="border-bottom: 1px solid black; height: 1.2em; margin-bottom: 2px;"></div> <div style="border-bottom: 1px solid black; height: 1.2em; margin-bottom: 2px;"></div> <div style="border-bottom: 1px solid black; height: 1.2em;"></div>			
Inspector's Immediate Recommendations: <div style="display: flex; justify-content: space-between; margin-top: 5px;"> ____ Immediate Closure Required ____ Immediate Blocking/Shoring Required </div> <div style="margin-top: 5px;"> ____ Reduce Travelway Width (provide details): _____ _____ </div> <div style="margin-top: 10px;"> ____ Other: _____ _____ </div> <div style="margin-top: 10px;"> ____ Immediate Notification: <div style="display: flex; justify-content: space-between; margin-left: 150px;"> Installation Bridge Manager: _____ </div> <div style="display: flex; justify-content: space-between; margin-left: 150px;"> National Bridge Program Manager: _____ </div> </div>			
Plan of Action: _____ Date: _____ <div style="border-bottom: 1px solid black; height: 1.2em; margin-bottom: 2px;"></div> <div style="border-bottom: 1px solid black; height: 1.2em; margin-bottom: 2px;"></div> <div style="border-bottom: 1px solid black; height: 1.2em; margin-bottom: 2px;"></div> <div style="border-bottom: 1px solid black; height: 1.2em;"></div>			
Follow-up Actions: _____ Completion Date: _____ <div style="border-bottom: 1px solid black; height: 1.2em; margin-bottom: 2px;"></div> <div style="border-bottom: 1px solid black; height: 1.2em; margin-bottom: 2px;"></div> <div style="border-bottom: 1px solid black; height: 1.2em; margin-bottom: 2px;"></div> <div style="border-bottom: 1px solid black; height: 1.2em;"></div>			

B-10 ORGANIZATIONAL RESPONSIBILITIES.

Table B-4 National Bridge Program Manager (NBPM) and Installation Bridge Manager (IBM) Responsibilities by Military Department

BRIDGE INSPECTION RESPONSIBILITIES				Navy		Air Force		Army	
ID No.	Category	Task	Para. Ref.	NBPM	IBM	NBPM	IBM	NBPM	IBM
B11.1	Qualifications	Responsible for approving all bridge inspector qualifications prior to inspection per 23 CFR Subpart C, 49 CFR 237, and UFC 3-310-08.	2-1.5, 2-1.6, 2-1.7	X			X	X	
B11.2	Inventory	Responsible for establishing and maintaining program bridge inventory per UFC guidelines.	2-1.1	X		X		X	
B11.3	Inventory	Responsible for notifying NBPM of changes to the existing bridge inventory.	3-1, 3-2		X		X		X
B11.4	Inventory	Responsible for compiling and maintaining bridge inspection inventory.	2-1.1, 2-1.2	GLOBAL	LOCAL	GLOBAL	LOCAL	GLOBAL	LOCAL
B11.5	Inventory	Recommends bridges to be removed and/or placed onto the bridge inspection inventory.	Ch. 3, 4, 5, 6	X			X		X
B11.6	Inventory	Responsible for implementing the NBPM recommendations for bridge inspection inventory.	2-1.2		X		X		X
B11.7	Records	Responsible for establishing a standard bridge records system.	2-2, 2-2.1, 2-2.2	X		X		X	
B11.8	Records	Responsible for maintaining bridge records per the UFC, including inspection reports and follow-up actions taken.	2-2.1, 2-2.2, 3-2.4, 3-3.3, 4-4, 5.3	GLOBAL	LOCAL		X		X
B11.9	Planning	Responsible for coordination with the NBPM and granting access to facilitate bridge inspection operations.	2-1.2		X		X		X
B11.10	Planning	Responsible for coordination with the NBPM and granting access to allow adequate QC/QA.	2-1.2, 2-3		X		X		X
B11.11	Execution	Responsible for implementing and executing NBIS and FRA reportable inspections, including development of inspection reports and recommendations.	2-1.1, 2-1.2, 3-2, 4-1	X		N/A	X	N/A	X

BRIDGE INSPECTION RESPONSIBILITIES				Navy		Air Force		Army	
ID No.	Category	Task	Para. Ref.	NBPM	IBM	NBPM	IBM	NBPM	IBM
B11.12	Execution	Responsible for funding, implementing, and executing pedestrian and golf cart bridge inspections that require a load rating under paragraph 5-2, including developing inspection reports and recommendations.	5-1, 5-2	X		N/A	X	N/A	X
B11.13	Execution	Responsible for funding, implementing, and executing inspection of all other NBIS and FRA non-reportable bridge inspections and pedestrian and golf cart bridge inspections not inspected under the requirements of B11.12, including developing inspection reports and recommendations.	3-3, 4-2, 5-1		X	N/A	X	N/A	X
B11.14	Execution	Responsible for developing inspection report content and compliance with current CFR requirements.	3-2.2 4-1.3	X			X	X	
B11.15	QA	Responsible for implementing and performing QC/QA, including review of inspection reports, recommendations, plans of action, and periodic field reviews.	2-3	X			X	X	
B11.16	QA	Recommends corrective action to Installation Commander based upon QC/QA findings.	2-3	X		X	X	X	
B11.17	QA	Responsible for taking corrective action on QC/QA issues.	2-3		X		X		X
B11.18	Interval	Recommends decreasing inspection interval.	3-2.2.1, 4-2.1	X		X	X	X	
B11.19	Interval	Responsible to implement the NBPM interval recommendation.	3-2.2.1	X			X		X
B11.20	Interval	May request variance from UFC guidance with regards to inspection interval.	3-2.2.1, 4-2.1	X		X	X	X	X
B11.21	Repair	Responsible for executing and completing repair recommendations.	7-1.4, 9-2		X		X		X
B11.22	Repair	Reviews that appropriate actions are taken on recommended repairs.	7-1.4, 9-2	X	X	X	X	X	X
B11.23	Scour	Responsible for assessing scour and providing recommendations and a scour POA	7-2	X			X		X
B11.24	Scour	Responsible for implementing scour recommendations and adhering to a scour POA	7-2		X		X		X

BRIDGE INSPECTION RESPONSIBILITIES				Navy		Air Force		Army	
ID No.	Category	Task	Para. Ref.	NBPM	IBM	NBPM	IBM	NBPM	IBM
B11.25	Load Rating	Ensure bridges are load rated and files are maintained. Responsible for reviewing load ratings and load rating records.	3-2.3, 3-3.1, 3-3.2, 4-3, 5-2	GLOBAL	LOCAL		X		X
B11.26	Load Rating	Responsible to determine and communicate live load cases required, including tactical vehicles and special rail car usage to the NBPM.	3-2.3, 3-3.1, 3-3.2, 4-3, 5-2		X		X		X
B11.27	Load Rating	Responsible for performing and updating load ratings in accordance with current standards and mobilization requirements, as well as maintaining records.	3-1.3, 3-2.2, 4-3, 5-2	X			X		X
B11.28	Posting	Responsible for recommending load posting.	3-2.3.4, 4-3, 5-2	X			X		X
B11.29	Posting	Responsible for posting bridges.	3-2.3.4, 4-3, 5-2		X		X		X
B11.30	New Projects	Responsible for advising the NBPM of new bridge construction projects and providing the PM with the DD-1391 as well as design documentation and schedules so that appropriate resources can be allocated for initial and subsequent routine bridge inspections.	N/A		X	N/A	N/A	N/A	N/A
B11.31	Repair Projects	Responsible for advising the NBPM of bridge repair projects and providing design documentation and schedules so appropriate planning can be performed to accommodate additional bridge inspection funding and requirements such as a revised load rating.	7-1.4, 9-2		X	N/A	N/A	N/A	N/A

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APPENDIX C GLOSSARY

AAR—Association of American Railroads

AASHTO— American Association of State Highway and Transportation Officials

ACI—American Concrete Institute

AREMA—American Railway Engineering and Maintenance-of-Way Association

BIRM—FHWA *Bridge Inspector's Reference Manual*

CFR—Code of Federal Regulations

CONUS—Continental United States

DD 1391—FY ____ Military Construction Project Data

DOD—Department of Defense

EM—Army Engineering Manual

FCM—fracture critical member

FHWA EFLHD—Federal Highway Administration, Eastern Federal Lands Highway Division

FHWA—Federal Highway Administration

FM—Army Field Manual

FRA—Federal Railway Administration

IBM—Installation Bridge Manager

LRFD—Load and resistance factor design

MLC—military load classification

MUTCD—AASHTO *Manual on Uniform Traffic Control Devices for Streets and Highways*

NBI—National Bridge Inventory

NBIS—*National Bridge Inspection Standards*

NBPM—National Bridge Program Manager

NDT—nondestructive techniques

OCONUS—Outside Continental United States

PDT—partially destructive techniques

P.E.—Professional Engineer

POA—Plan of Action

psf—pound per square foot

QA—quality assurance

QC—quality control

SI&A—Structure Inventory and Appraisal

STANAG—Standardization Agreement

STRAHNET—Strategic Highway Corridor Network

TM—Army Technical Manual

UFC—Unified Facilities Criteria

USC—United States Code

A black and white photograph of an M88A3 Hercules heavy recovery vehicle. The vehicle is a tracked tank-like machine with a large crane mounted on its rear. The crane's boom is extended upwards and to the left, with cables hanging from it. The vehicle is positioned on a paved surface, and a line of trees is visible in the background under a cloudy sky. The vehicle's body is dark, and it has several large, rectangular storage compartments on its side. The tracks are visible along the bottom of the vehicle.

Heavy Recovery Vehicle

M88A3 HERCULES

baesystems.com

BAE SYSTEMS

The M88A3 HERCULES is the next iteration to the M88 HERCULES Family of Vehicles. It enhances the performance, survivability and responsiveness of the combat-proven M88A2 and it restores single-vehicle recovery on tanks weighing up to 80 tons. The M88A3 performs hoisting, winching, and towing operations for today's heaviest combat systems, like the M1 main battle tank.



Performance

An upgraded liquid cooled powerpack provides improvements to mobility, reliability, diagnostic/prognostic capability and vehicle weight. The addition of a seventh road wheel also increases stability during recovery operations and improves ground pressure distribution.

Survivability

The M88A3 HERCULES features improved armor protection.

Responsiveness

Seven station hydro-pneumatic suspension units (HSUs) and hull modifications offers improvements to enable single-vehicle recovery; ground pressure distribution, integration weight and lockout capability. This locking capability enables greater stability and response during hoisting operations.

Specifications

Vehicle weight	78 Tons
Personnel capacity	Driver, Mechanic, Commander + Recovered MBT Crew
Gross horsepower	1350 HP (C32 Acert)
Estimated Speed	35 mph
Estimated cruising range	250 miles/405 km
Slide Slope	60%
Trench crossing	103 inches/2.6 m
Vertical wall crossing	42 inches/1.0 m
Overall length	338 inches/8.5 m
Width	145 inches/3.6 m
Height	124 inches/3.1 m
Ground clearance	16+ Inches
Hoisting Capacity	80,000 lbs
Pick & Carry Capacity	64,000 lbs
Recovery Capacity	160,000 lbs (80 Ton)

This document gives only a general description of products and services and except where expressly provided otherwise shall not form part of any contract. From time to time, changes may be made in the products or conditions of supply.

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08.20.M88A3.BTR Approved for public release XXXX-XX.

BAE SYSTEMS



2.2

CONDITIONS

2.2 CONDITIONS

2.2.1 Uniform General Conditions for Public Works Contract in Puerto Rico

The Uniform General Conditions for Public Works Contract in Puerto Rico will be part of this bids process and contract. All costs associated and related with the Uniform General Conditions for Public Works Contract in Puerto Rico will be part of the offer. *See Attachment 1*

2.2.2 Additional Provisions

The Additional Provisions will be part of this bids process and contract. All costs associated and related with the Additional Provisions will be part of the offer. *See Attachment 2*

2.2.3 Contract Federal Clauses

The Contract Federal Clauses will be part of this bids process and contract. All costs associated and related with the Contract Federal Clauses will be part of the offer. *See Attachment 3*

2.2.4 Imperative Inclusion Clauses

The Imperative Inclusion Clauses Clause will be part of this bids process and contract. All costs associated and related with the Contract Federal Clauses will be part of the offer. *See Attachment 4*

2.2.5 Security and Protection Requirements

The Bidder, Team and all associated Subcontractor personnel must provide all information required for background checks to comply with the requirements for access to the facilities to be performed by the Provost Marshal Office, Director of Emergency Services or the Office of Security. The Proposing workforce must comply with all personal identity verification requirements (clause FAR 52.204- 9, Verification of personal identification of Contractor personnel) as directed by the Department of Defense, HQDA and / or local policy. In addition to the changes authorized by the change clauses of this Purchase Order, if the Force Protection Condition (FPCON) in any individual installation or insulation change, the Government may require changes in the Contractor's security issues or processes.

The photographs will be limited to the authorized work area with the prior approval of the PRARNG and only for information purposes for the development of the services described in this document. The Contractor must request permission from the PRARNG before taking the photographs and will be governed by the instructions offered for taking them. The use of drone to take is prohibited.

2.2.5.1 Anti-Terrorism/Force Protection

AT Level I training, all awarded Contractor's personnel, to include subcontractor personnel, requiring access PRARNG installations, facilities and controlled access areas shall complete AT Level I awareness training within fourteen (14) calendar days after Purchase Order start date or effective date of incorporation of this requirements into the Purchase Order, whichever is applicable. The awarded Bidder shall submit certificates of completion for each affected Contractor's personnel and subcontractor's personnel to the Contracting Officer Representative (COR) within seven (7) calendar days after completion of training by all personnel. AT Level I awareness training is available at the following website: <http://jko.jten.mil> The PRARNG can provide the instructions (2 hours) with previous coordination.

- Access and general protection/security policy and procedures. Awarded Bidder and all associated subcontractor's personnel shall provide all information required for background checks to meet installation access requirements to be accomplished by installation Provost Marshal Office, Director of Emergency Services or Security Office. Awarded Bidder workforce must comply with all personal identity verification requirements (FAR clause 52.204-9, Personal Identify Verification of Contractor Personnel) as directed by DoD, HQDA and/or local policy. In addition to the changes otherwise authorized by the changes clause of this Purchase Order, should the Force Protection Condition (FPCON) at any individual facilities or installation change, the Government may require changes in contractor security matters or processes.
- Awarded Bidder and all associated sub-contractor's personnel shall comply with all standards and policies for all PRARNG installations and facilities to include access and local security policies and procedures (provided by government representative). This applies for contractors that do not require CAC but require access to a DoD facilities or installations.

2.2.5.2 iWATCH

iWATCH training, Contractor's personnel, to include subcontractor personnel, requiring access PRARNG installations, facilities and controlled access areas shall complete iWATCH awareness training within fourteen (14) calendar days after Purchase Order start date or effective date of incorporation of these requirements into the Purchase Order, whichever is applicable. The Contractor shall submit certificates of completion for each affected Contractor's personnel and subcontractor's personnel to the Contracting Officer Representative (COR) within ten (10) calendar days after completion of training by all personnel. The PRARNG can provide training in face-to-face to personnel of Contractor and Subcontractor (1 hour) with previous coordination.

2.2.5.3 TARP

Threat Awareness and Reporting Program (TARP) training, Contractor's personnel, to include subcontractor personnel, requiring access PRARNG installations, facilities and controlled access areas shall complete TARP awareness training within fourteen (14) calendar days after Purchase Order start date or effective date of incorporation of these requirements into the Purchase Order, whichever is applicable. The Contractor shall submit certificates of completion for each affected Contractor's personnel and subcontractor's personnel to the Contracting Officer Representative (COR) within ten (10) calendar days after completion of training by all personnel. The PRARNG can provide training in face-to-face to personnel of Contractor and Subcontractor (2 hours) with previous coordination.

Attachment 1

**UNIFORM GENERAL
CONDITIONS FOR PUBLIC
WORKS CONTRACTS IN PUERTO
RICO**



DEPARTAMENTO DE TRANSPORTACIÓN Y OBRAS PÚBLICAS
DEPARTMENT OF TRANSPORTATION AND PUBLIC WORKS
GOBIERNO DE PUERTO RICO

DEPARTAMENTO DE ESTADO

Número: **7998**

Fecha: **3 de marzo de 2011**

Aprobado: **Hon. Kenneth D. McClintock**
Secretario de Estado

Por: **Eduardo Arosemena Muñoz**
Secretario Auxiliar de Servicios

UNIFORM GENERAL CONDITIONS

for

Public Works Contracts in Puerto Rico

UNIFORM GENERAL CONDITIONS

PUERTO RICO
VERDE



Public Works Contracts in Puerto Rico

UNIFORM GENERAL CONDITIONS FOR PUBLIC WORKS CONTRACTS

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GOVERNMENT OF PUERTO RICO
DEPARTMENT OF TRANSPORTATION AND PUBLIC WORKS

UNIFORM GENERAL CONDITIONS FOR PUBLIC WORKS CONTRACTS

PART A. INTRODUCTION

ARTICLE 1 -LEGAL BASIS; APPLICATION

1.1 Legal Basis. The Secretary of Transportation and Public Works, in accordance with the powers conferred upon him by Law No. 198 of May 15, 1943, as amended by Law No. 131 of September 2, 2010 and Law No. 170 of August 12, 1988, as amended, hereby enacts the following regulations to establish the applicable legal framework for the contracting and management of all public works.

1.2. Application. The provisions of these Regulations shall be applicable to all contracts for public works executed by all government agencies, departments, public corporations and instrumentalities.

PART B. UNIFORM GENERAL CONDITIONS

ARTICLE 1 -DEFINITIONS AND TERMINOLOGY

1.1 Defined Terms

1.1.1 Wherever used in the Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof.

1.1.1.1. Agreement (or Contract) - The written instrument, which is evidence of the agreement between Owner and Contractor covering the Work.

1.1.1.2. Application for Payment - The form acceptable to Owner which is to be used by Contractor during the course of the Work in requesting progress or final payment and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

1.1.1.3. Architect/Engineer - The Architect or Engineer, referred herein as Architect/Engineer, is the collegiate professional licensed to practice architecture, engineering or surveying in the Commonwealth of Puerto Rico and is referred to throughout the Contract Documents. It is the Architect or Engineer authorized by the Owner for the preparation of all construction documents, plans and specifications and to submit such documents for the approval of the related public agency. The Architect/Engineer may designate an authorized representative. The Architect/Engineer is the individual or entity named as such in the Agreement.

1.1.1.4. Architect/Engineer's Consultant - An individual or entity having a contract with the Architect/Engineer to furnish services as Architect/Engineer's independent professional and collegiate consultant with respect to the Project and who is identified as such in the Supplementary Conditions.

1.1.1.5. Bonds - Performance and Payment bonds and other instruments of surety required in the Contract Documents.

UNIFORM GENERAL CONDITIONS FOR PUBLIC WORKS CONTRACTS

1.1.1.6. Certificate of Final Acceptance - Certificate issued by the Owner, or its duly authorized representative to Contractor indicating the date that the Work reached Final Acceptance.

1.1.1.7. Certificate of Substantial Completion - Certificate issued by the Owner, or its duly authorized representative, to the Contractor indicating the date that Substantial Completion was achieved for the Work.

1.1.1.8. Change in Law - Change in Law shall include: (i) the enactment or adoption by any legislative, regulatory, executive or administrative body of the Commonwealth of Puerto Rico or of the United States of America of any law, or any change or amendment to any law, in force as of the bid opening date, (ii) any change in the interpretation thereof which is final and not subject to administrative or judicial review, which cannot be complied with by a party without incurring in additional costs.

1.1.1.9. Change Order - A written order issued by the Owner, or its duly authorized representative, to the Contractor, signed by both parties, covering, additions, deletions, and/or revisions in the Work and/or an adjustment in the Contract Price and/or the Contract Time, if any, issued on or after the Effective Date of the Agreement. In Unit Price Contracts, a Change Order can also reflect a change in the number of items, as well as an increase or decrease, contained in the proposal. In Lump Sum Contracts, it reflects an order for additional or less work.

1.1.1.10. Claim - A claim is a demand or assertion by one of the parties seeking, as a matter of right, adjustment or interpretation of Contract terms, payment of money, extension of time or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. Claims must be made by written notice and in accordance with Article 11.5. The responsibility to substantiate Claims shall rest with the party making the Claim.

1.1.1.11. Commonwealth - The Commonwealth of Puerto Rico.

1.1.1.12. Construction Change Directive - A Construction Change Directive is a written order signed by the Owner, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Price or Contract Time, or both. The Owner may, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Price and Contract Time adjusted accordingly. A Construction Change Directive shall be used only in the absence of total agreement on the terms of the Change Order, Extra Work Order or Work Change Directive, and shall be paid with the monthly Progress Payment according to the method indicated in Article 10.1.2.3.

1.1.1.13. Contract (or Agreement) - The entire and integrated written Agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

1.1.1.14. Contract Documents - The Contract Documents establish the rights and obligations of the parties and include: (i) the Agreement, (ii) addenda (which pertain to the Contract Documents), (iii) Contractor's bid or proposal (including documentation accompanying the Bid and any post Bid documentation submitted prior to the Notice of Award), (iv) the Notice to Proceed, (v) the Bonds, (vi) these General Conditions, (vii) the Supplementary Conditions, (viii) the Special Provisions, (ix) the Specifications, (x) the Drawings as the same are more specifically identified in the Agreement, including Standard Drawings, if applicable and (xi) Instructions to Bidders. It shall also include: (i) all Written Amendments, (ii) Change Orders and Extra Work Orders, (iii) Work Change Directives, (iv) Field Orders and (v) Architect/Engineer's written interpretations and clarifications issued on or after the Effective Date of the Agreement. Approved Shop Drawings and the reports and drawings of subsurface and physical conditions are not Contract Documents. Only printed or hard copies of the items listed in this Article are Contract Documents. Files in electronic media format of text, data, graphics, and the like that may be furnished by Owner to Contractor are not Contract Documents, unless otherwise specified in the bid documents.

UNIFORM GENERAL CONDITIONS FOR PUBLIC WORKS CONTRACTS

1.1.1.15. Contract Item or Pay Item - A portion of Work specifically described and for which a price either unit or lump sum is provided. It includes the performance of all Work and the furnishing of labor, equipment and materials described in the Specifications.

1.1.1.16. Contract/Project Limits - The area, including Site and off-Site, within which the Work is to be performed.

1.1.1.17. Contract Price - See Contract Sum.

1.1.1.18. Contract Sum - It is the Contract Price as stated in the Agreement and is the total amount payable by the Owner to the Contractor for the performance of the Work under the Contract Documents subject to additions and deductions, stipulated in the Contract Documents.

1.1.1.19. Contract Time or Time - It is the period of time allotted in the Contract Documents for Substantial Completion of the Work.

1.1.1.20. Contract Unit - A major subdivision of the construction Project identified as such in the Contract Documents.

1.1.1.21. Contracting Officer - The Contracting Officer is the authorized representative of the Owner under the Contract Documents.

1.1.1.22. Contractor - The Contractor is the person or organization that contracts with the Owner for the performance of the Work described in the Contract Documents. The term Contractor, identified as such in the Agreement, means the Contractor or his authorized representative. In cases of Design-Build Contracts, the term Contractor shall also signify the Design-Builder Contractor.

1.1.1.23. Cost of the Work - See section 10.2 for definition.

1.1.1.24. Day - The word "day" shall constitute a calendar day of twenty-four (24) hours measured from midnight to the next midnight.

1.1.1.25. Design-Build Contracts - Shall be those contracts where the Contractor undertakes the duty to design the Work, in addition to performing the duties of Contractor.

1.1.1.26. Design-Builder Contractor - Shall be the Contractor in Design-Build Contracts, who in addition to having all duties of Contractor has the duty to design the Work, as specified in the Contract Documents.

1.1.1.27. Dispute - Any Claim, dispute or other disagreement involving the interpretation of the Contract Documents, a change in the Contract Sum, and or a change in the Contract Time, and other matters in question arising out of, or relating to the Contract or the breach thereof, except for Claims which have been waived by lack of proper notice and/or the making or acceptance of final payment as provided in Articles 13.7.2 and 13.9.1

1.1.1.28. Drawings or Plans - The approved drawings and supplementary drawings showing the location, character, dimensions, and details of the Work to be done which are part of the Contract Documents.

1.1.1.29. Effective Date of the Agreement - The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the parties to the Contract.

1.1.1.30. Engineer or Architect - See Architect/Engineer.

UNIFORM GENERAL CONDITIONS FOR PUBLIC WORKS CONTRACTS

1.1.1.31. Equal or Similar and Substitute - "Similar or Equal" or "Substitute", when used in relation to materials, parts, machinery, equipment, formulas of the Project and/or anything to them related, shall mean that they be of substantially the same quality, form, appearance, resistance, endurance, efficiency, capacity, safety, specifications and any other quality inherent, or related, to them as they are indicated in the drawings and/or specifications of the Contract.

1.1.1.32. Equipment - All machinery and implements, together with the necessary supplies for upkeep and maintenance, and all tools and apparatus necessary for the proper construction and acceptable completion of the Work.

1.1.1.33. Extra Work - An item of Work not provided for in the Contract as awarded but found by the Owner or its duly authorized representative necessary for the satisfactory completion of the Contract within its generally intended scope.

1.1.1.34. Extra Work Order - Is a written order issued by the Owner to Contractor and signed by both parties in a unit price contract concerning the performance of the Work or furnishing of materials involving Extra Work. It authorizes a change in the Work, adjustments in the Contract Price and/or Contract Time for services, or Work, for which there is no basis of payment, either direct or indirect, provided in the proposal, or Contract, or if the resulting overruns, or underruns, of any item, or items, exceed certain percentages. Extra Work Orders apply only to unit price contracts. Such Extra Work may be performed at agreed prices or as provided in Section 10.2 of these General Conditions.

1.1.1.35. Federal Agency - Any agency of the government of the United States of America or its succeeding agency.

1.1.1.36. Field Order - A written order issued by the Owner that requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Time.

1.1.1.37. Final Acceptance - Shall mean the acceptance of the Work by the Owner after the final inspection as evidenced by the Certificate of Final Acceptance sent to Contractor by Owner.

1.1.1.38. Force Account Work - Additional Work that is paid for based on the Cost of the Work as defined in Article 10.2.

1.1.1.39. Force Majeure - Means an act of God; earthquake; tidal wave; hurricane; act of the public enemy; war; blockade; public riot; lighting; fire; flood; explosion; a strike, excluding strikes and any other activity or demonstration by Owner's personnel that does not interfere directly with the Work; and any other cause, whether of the kind specifically enumerated herein or otherwise, which is not reasonably within the sole control of Contractor. A rain, windstorm flood or other natural phenomenon of normal intensity for the particular locality shall not be construed as Force Majeure.

1.1.1.40. Hazardous Environmental Condition - The presence at the Site of asbestos, PCBs, petroleum, hazardous waste, or radioactive material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.

1.1.1.41. Hazardous Waste - The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 U.S.C. §6903) as amended.

1.1.1.42. Holidays - Saturdays, Sundays and the legal holidays listed below on which the Contractor will not be allowed to perform Work under the Contract except as otherwise ordered or authorized in writing by the Owner. All other Holidays not listed below will be considered working days. Also, if any of the listed holidays falls on a Sunday, the following Monday will be considered a holiday.

UNIFORM GENERAL CONDITIONS FOR PUBLIC WORKS CONTRACTS

New Year's Day	January 1
Three Kings Day	January 6
Good Friday	Variable
Independence Day	July 4
Constitution Day	July 25
Labor Day	First Monday of September
Election Day (when occurring)	Tuesday after 1 st Monday in November
Thanksgiving	Fourth Thursday in November
Christmas Day	December 25

1.1.1.43. Laboratory - The material testing laboratory of the Owner or any other testing laboratory which may be approved by the Owner or its duly authorized representative.

1.1.1.44. Laws and Regulations; Laws or Regulations - Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

1.1.1.45. Liens - Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

1.1.1.46. Major and Minor Contract Items - Any item having a Contract value equal to or greater than five per cent (5%) of the original Contract amount shall be considered as a major item. All the other Contract items shall be considered as minor items. A minor item may become a major item when the minor item is increased to the extent that the total cost of the item is equal to or greater than five per cent (5%) of the original Contract amount.

1.1.1.47. Materials - Any substances specified for use in the construction of the Project and its appurtenances.

1.1.1.48. Milestone - A principal event specified in the Contract Documents related to an intermediate completion date or time prior to the Substantial Completion of the whole Work.

1.1.1.49. Notice of Award - The written notice by the Owner to the apparent successful bidder stating that upon timely compliance by the apparent successful bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.

1.1.1.50. Notice to Proceed - A written notice issued by the Owner to the Contractor fixing the date on which the Contract Time will commence to run and on which Contractor shall start to perform the Work under the Contract Documents. Such Notice to Proceed shall identify the persons included in article 5.2.2. Unless otherwise agreed by the parties, all permits and/or endorsements to be furnished by the Owner needed to start construction of the Project must be obtained prior to issuance of the Notice to Proceed.

1.1.1.51. OCIP - see Owner-Controlled Insurance Program.

1.1.1.52. Off-Site Work - Work to be performed outside of the of the Project's limits.

1.1.1.53. Owner - The Owner is the Department, Agency, Public Corporations, or any other instrumentality of the Commonwealth of Puerto Rico as identified in the Agreement and is referred to throughout the Contract Documents as if singular in number and masculine in gender. The term Owner means the Owner or his authorized representative. It shall also mean any person, or entity, named as such in the Contract Documents.

1.1.1.54. Owner-Controlled Insurance Program - also known as "OCIP". An insurance program under which

UNIFORM GENERAL CONDITIONS FOR PUBLIC WORKS CONTRACTS

Commercial General Liability, Excess General Liability, Builder's Risk, and Contractor's Pollution Liability coverage are procured or provided by the Owner for the Contractor, Subcontractors of any tier, who have been properly enrolled, while performing operations at the Project Site.

1.1.1.55. Owner's Representative - One or more persons or entity designated by the Owner, who will perform the functions of the Owner as described in these General Conditions. The Owner's Representative may employ Project Inspectors and/or other assistants to perform any function, duty or responsibility, as delegated by the Owner's Representative, including but not limited to the detailed inspections of performance of any or all portions of the Work.

1.1.1.56. Partial Utilization - Use by Owner of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work.

1.1.1.57. Pay Item - See Contract Item.

1.1.1.58. Payment Bond - The security required to be furnished by the Contractor and his Surety and approved by the Owner to guarantee the payment of all persons or entities supplying labor, material and equipment in the prosecution of the Work or services required for completion of the Contract.

1.1.1.59. Performance Bond - The security required to be furnished by the Contractor and his Surety and approved by the Owner to guarantee the completion of all the requirements of the Contract.

1.1.1.60. Plans - See Drawings.

1.1.1.61. Project - The total construction of which the Work to be performed under the Contract Documents is the whole, or part.

1.1.1.62. Project Inspector - The professional, duly licensed and collegiate Engineer or Architect, or a legally qualified entity, contracted and/or designated by the Owner and/or the Owner's Representative to perform, as a Project Inspector, the continuous on Site inspection of any or all portions of the Work.

1.1.1.63. Project Manager - The professional licensed and collegiate Engineer or Architect, designated in accordance with the Contract as the Contractor's authorized representative who is made by Contractor responsible for and placed in charge of the Work.

1.1.1.64. Project Manual - The bound documentary information prepared for bidding and constructing the Work.

1.1.1.65. Project Schedule - A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Work within the Contract Times, as required by Article 6.4 of these General Conditions.

1.1.1.66. Reasonable Close Conformity - Compliance with reasonable and customary manufacturing and construction tolerances when working tolerances are not specified. When working tolerances are specified, reasonably close conformity means compliance with such working tolerances. Without detracting from the complete and absolute discretion of the Owner or its duly authorized representative to insist upon compliance with such tolerances, the Owner or its duly authorized representative may, at his sole option and reasonable discretion, accept variations beyond such tolerances when and where they will not materially affect the value or utility of the Work and the interests of the Owner.

1.1.1.67. Reference Specifications - Specifications issued by other official and/or professional organizations that are referred to and made part of the Owner's specifications and other Contract Documents. Unless otherwise specifically indicated in the Contract Documents, references cited shall be the edition of such specifications in effect at the time the Project is advertised for bids/proposals.

UNIFORM GENERAL CONDITIONS FOR PUBLIC WORKS CONTRACTS

1.1.1.68. Right of Way - A general term denoting land, property, easement or interest therein, usually in a strip, acquired for the Project or for the benefit of another project or public utility.

1.1.1.69. Samples - Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

1.1.1.70. Shop Drawings or Working Drawings - All drawings, diagrams, schedules, and other data or information, which are specifically prepared or assembled by or for the Contractor and submitted by Contractor to illustrate some portion of the Work.

1.1.1.71. Site - Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner that are designated for the use of Contractor. It shall also mean areas for the performance of off-site work, if same is required in the Contract Documents.

1.1.1.72. Special Conditions - Special requirements, regulations or direction, covering conditions peculiar to a particular project. Special Conditions shall prevail over particular provisions of these General Conditions only when such option is provided in any particular Article of these General Conditions by the use of words such as "unless otherwise indicated in the Contract Documents..." In all other instances these General Conditions shall prevail over any conflicting provision contained in the Special Conditions.

1.1.1.73. Specialty Item - A Contract Item, which is specifically identified in the Contract Documents as exempted from the computations to determine the total amount of the Work that the Contractor may be authorized to subcontract.

1.1.1.74. Specifications - That part of the Contract Documents consisting of written Technical Specifications, descriptions of materials, equipment, systems, standards, and workmanship as applied to the Work and certain administrative details applicable to the Work.

1.1.1.75. Standard Drawings - See Standard Plans.

1.1.1.76. Standard Plans (or Standard Drawings) - Drawings approved for repetitive use, showing details to be used where appropriate, included in the Plans or published as a separate document.

1.1.1.77. Standard Specifications - The set of specifications approved by the Owner for general application and repetitive use.

1.1.1.78. Subcontractor - A Subcontractor is an individual or entity that has a direct contract with the Contractor to perform any of the Work at the Site. The term Subcontractor as referred throughout the Contract Documents means the Subcontractor or his authorized representative.

1.1.1.79. Substantial Completion - The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of the Owner, or its authorized representative, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

1.1.1.80. Supplemental Agreement - A written agreement executed by the Contractor and Owner supplementing the Contract to cover Extra Work and/or changes and/or changed conditions incidental to and necessary for the acceptable completion of the Project.

UNIFORM GENERAL CONDITIONS FOR PUBLIC WORKS CONTRACTS

1.1.1.81. Supplemental Specifications - Approved additions and/or revisions to the Standard Specifications, including Technical Specifications.

1.1.1.82. Supplementary Conditions - That part of the Contract Documents that amends, or supplements, where allowed, these General Conditions.

1.1.1.83 Supplier - A manufacturer, fabricator, supplier, distributor, materialmen, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work.

1.1.1.84. Surety - The insurance or bonding corporation or other legal entity, other than the Contractor, authorized to do business in Puerto Rico, bound with and for the Contractor for the proposal guaranty and/or the Payment Bond and/or the Performance Bond, or other bonds and insurances required by the Contract Documents.

1.1.1.85. Technical Specifications - The directions, provisions and requirements setting forth, or relating to, the performance of the Work and to the kind and quality of materials and labor to be furnished under the Contract for the execution of the Project. Any entity making changes in the Technical Specifications and/or Plans and Drawings, must perform so complying with all laws, codes, rules and regulations applying to them.

1.1.1.86. Underground Facilities/Utilities - All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any easements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

1.1.1.87. Unit Price Work - Work to be paid for based on unit prices.

1.1.1.88. Utility - A public or privately owned agency or entity and the lines and facilities for producing, transmitting or distributing data or voice communications, power, electricity, gas, oil, gasoline, water, sewer and similar commodities for public or private use.

1.1.1.89. Work - The entire construction referred to in the Agreement and the performance of the services identified to be provided in the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce and make workable such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

1.1.1.90. Work Change Directive - A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by the Owner and recommended by the Architect/Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Time but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Time.

1.1.1.91. Work Order - A written order, signed by the Owner, or its duly authorized representative, which requires performance of a specific contractual issue by the Contractor without negotiation of any sort. If Contractor is not in agreement with the Work Order, he may present a Claim as established in Article 11.5.

1.1.1.92. Working Day - A calendar day, exclusive of Saturday and Sunday and designated legal holidays. All periods of time under the Contract Documents shall be measured in calendar days, unless Working Days are specified.

1.1.1.93. Working Drawings - See Shop Drawings.

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1.1.1.94. Written Amendment - See Supplemental Agreement.

1.2 Other Terms - The Owner's manuals and sets of regulations contain additional terms, not included above, which are used in the plans and other Contract Documents. Such terms shall be interpreted as defined in the Owner's manuals and sets of regulations.

1.3 Terminology

1.3.1 Intent of Certain Terms or Adjectives.

1.3.1.1. Unless otherwise indicated in the Contract Documents, whenever in the Contract Documents the terms "as allowed," "as approved," or terms of like effect or import are used, or the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Architect/Engineer as to the Work, it is intended that such action or determination will be solely to evaluate, in general, the completed Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective shall not be effective to assign to Architect/Engineer any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of these General Conditions and the Contract Documents.

1.3.2 Deficient.

1.3.2.1. The word "deficient," when modifying the word "Work," refers to Work, or part of it, that is unsatisfactory, faulty, or defective in that it does not conform to the Contract Document or does not meet the requirements of any inspection, reference standard, test, or approval referred to in the Contract Documents, or has been damaged prior to Owner's Representative's recommendation of final payment, unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with these General Conditions.

1.3.3 Furnish, Install, Perform, Provide.

1.3.3.1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use, assembling, or installation and in usable or operable condition.

1.3.3.2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position, said services, materials, or equipment complete and ready for intended use.

1.3.3.3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.

1.3.3.4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "install," "perform" and/or, "provide" is implied.

1.3.4 Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

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ARTICLE 2 - CONTRACT DOCUMENTS

2.1 Intent and Interpretation of Contract Documents

2.1.1 The Contract Documents constitutes the Contract. The Contract Documents represent the entire and integrated agreement between the parties hereto and supersedes all prior negotiations, representations, or agreements, either written or oral, including the bidding documents. The Contract Documents may be amended or modified as set forth in section 2.6.

2.1.2 The intent of the Contract Documents is to provide for the construction and completion of the Work described.

2.1.3 The Contractor shall furnish all labor, materials, equipment, tools, transportation and supplies required to complete the Work in accordance with the plans, specifications and terms of the Contract Documents.

2.1.4 The relationship which the parties intend to create under the Contract Documents is that of principal and independent Contractor and nothing herein is intended or shall be construed, so as to create a relationship of any kind, form or manner, such as but not limited to partnership, co-venturers, or employment between the Owner and Contractor, unless clearly otherwise expressed in the Contract Documents.

2.2 Order of Precedence of Contract Documents

2.2.1 The Contract Documents for each particular Project shall specify the order of precedence among the diverse documents that form the Contract Documents, except for the order of precedence of the General Conditions which may not be altered unless allowed to be altered by means of the Special Conditions as described in Article 1.1.1.72. If no such order of precedence is established in the Contract Documents for the Project, the following order shall be followed:

2.2.1.1. Agreement (which shall include the Bonds and required insurance policies).

2.2.1.2. Dated Contractor's Proposal

2.2.1.3. All addenda issued prior to Bid Date. Unless no conflict exist between addenda, the issuance of a subsequent addendum will supersede all previously issued addenda.

2.2.1.4. Instructions to Bidders

2.2.1.5. The General Conditions of the Contract, (except where in accordance with Article 1.1.1.72 they are allowed to be changed by the Special Conditions).

2.2.1.6. Special Conditions.

2.2.1.7. Plans or Drawings

2.2.1.8. The Standard Drawings.

2.2.1.9. Specifications.

2.2.1.10. Technical Specifications.

2.2.1.11. Supplemental Specifications.

2.2.1.12. Standard Specifications.

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23 Written Interpretations

2.3.1 Provided reasonable time is granted to Owner, written interpretations necessary for the proper execution or progress of the Work in the form of drawings, or otherwise, will be issued with reasonable promptness by the Owner, its designated representative, or Architect/Engineer so as not to adversely affect the critical path of the Project Schedule.

2.3.2 Contractor may make written request to the Owner, Owner's Representative, or the Architect/Engineer for such interpretations, when deemed necessary for the proper progress of the Work.

2.3.2.1. Such interpretations shall be consistent with and reasonably inferable from the Contract Documents and may be effected by Field Orders.

2.3.2.2. Interpretation drawings are not necessarily changes in the Work.

2.3.3 Except as may otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

2.3.3.1. the provisions of any standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents); or

2.3.3.2. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

24 Execution and Correlation

2.4.1. The Agreement shall be signed by the Owner and Contractor or their authorized representatives. The other component parts of the Contract Documents, if not signed by the Owner or Contractor, shall be marked by their authorized representative.

2.4.2 By executing the Contract Documents, the Contractor represents that he has visited the Contract Limits within the Site, familiarized himself with the local conditions under which the Work is to be performed, correlated his observations with the requirements of Contract Documents, and accepts the same.

2.4.2.1 The Owner warrants that it has submitted all the necessary documents required of Owner to be submitted to the appropriate governmental agencies needed for the prosecution of the Work, as required by applicable laws and regulations.

2.4.3 The Owner and the Contractor acknowledge that no service or Work under the Contract Documents will be performed until both parties duly sign the Contract and the Notice to Proceed is issued.

2.4.3.1. No payment and/or disbursement will be made or paid for services rendered in violation of this clause.

2.4.4 The Contract Time.

2.4.4.1. The Contract Time must be specifically expressed on the Contract.

2.4.4.2. The Contract Time will be extended by the same number of days in which the term to execute the Work is extended by Change Orders or by any other mean allowed or permitted by the Contract or Contract Documents.

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2.4.4.3. Furthermore, the parties agree that no Work or service will be performed or received beyond Final Acceptance of the Contract.

2.4.4.4. No payment and/or disbursement will be made or paid for services rendered in violation of this clause.

2.4.5 The Contract Documents are complementary, and what is required by anyone shall be as obligatory as if required by all. The intention of the Contract Documents is to include all labor, materials, equipment and other items as provided on these General Conditions necessary for the proper execution and completion of the Work.

2.4.5.1. It is not intended that Work not covered under any heading, section, branch, class or trade of the Specifications shall be supplied unless it is required elsewhere in the Contract Documents.

2.4.5.2. The organization of the Specifications in divisions, sections, articles, and the arrangement of drawings shall not control the Contractor in dividing the Work among subcontractors or in establishing the extent of Work to be performed by any trade.

2.5 Review of Contract Documents and Field Conditions by Contractor.

2.5.1 Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents with each other and check and verify pertinent dimensions and quantities therein and all applicable field measurements.

2.5.2 Contractor shall promptly report in writing to Owner any conflict, error, ambiguity, inconsistency, discrepancy, or omission that Contractor may discover and shall obtain a written interpretation or clarification from Owner before proceeding with any Work affected by said conflict, error, ambiguity, inconsistency, discrepancy or omission.

2.5.2.1. However, Contractor shall not be liable to Owner for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents, unless Contractor failed to report it to the Owner with sufficient time for the Owner to provide a solution before the critical path of the Project is affected.

2.5.2.2. If the Contractor performs any construction activity in violation of this Article 2.5, the Contractor shall assume appropriate responsibility for such performance and shall bear an appropriate amount of the costs attributed to correction.

2.5.2.3. The Owner shall provide a solution to any reported conflict, error, ambiguity, discrepancy, or omission and if such solution adversely affects cost or the critical path of the Project, Owner will adjust Contract Price and Contract Time accordingly.

2.6 Amending and Supplementing Contract Documents

2.6.1 The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof in one (1) or more of the following ways:

2.6.1.1. a Written Amendment;

2.6.1.2. a Change Order;

2.6.1.3. an Extra Work Order; or

2.6.1.4. a Work Change Directive.

2.6.2 The requirements of the Contract Documents may be supplemented and minor variations and deviations in

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the Work may be authorized, by one (1) or more of the followings ways:

2.6.2.1. a Field Order;

2.6.2.2. Owner's, or his authorized representative's, approval of a Shop Drawing or Sample; or

2.6.2.3. Owner's, his authorized representatives, or Architect/Engineer's written interpretation or clarification.

2.6.3 A modification may be made only after execution of the Contract.

2.7 Copies Furnished, Ownership and Reuse of Documents

2.7.1. The Contractor will be furnished, free of charge, four (4) complete copies of the Contract Documents. Additional copies will be furnished upon request at the cost of reproduction. If Contractor so requests it, Owner will also furnish, free of charge, if available, an electronic file in PLT format (plot to File) so that the Contractor may make the copies of plans and/or drawings that he needs to build the Project. If such electronic files are not available, the Owner shall allow the Contractor to prepare electronic files and to print, at Contractor's cost, but without additional payment to Owner or Architect/Engineer, those copies needed for use by Contractor.

2.7.2. All Drawings, Specifications and copies thereof furnished by the Owner, Architect/Engineer, or Owner's Representative are, and shall remain, property of the Owner.

2.7.2.1. The Contractor can make copies of all the Drawings, Specifications, and other Contract Documents without permission, and without the payment of any fees or royalties, to the Owner, Architect/Engineer, or Owner's Representative as long as they are necessary for use in the execution of the Work.

2.7.3. Contractor and any Subcontractor or Supplier or other individual or entity performing or furnishing any of the Work under a direct or indirect contract with Owner:

2.7.3.1. shall not have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Owner, Architect/Engineer or Engineer's Consultant, including electronic media editions; and

2.7.3.2. shall not reuse any of such Drawings, Specifications, other documents, or copies thereof on extension of the Project or any other project without written consent of Owner.

2.7.4 This prohibition will survive final payment, completion, and acceptance of the Work, or termination or completion of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 3- BONDS AND INSURANCE

3.1 General- For Owners with OCIP

3.1.1 The Contractor shall not commence work under the Contract until he has obtained the various insurances policies and bonds specified in the Owner's Controlled Insurance Program. Owner shall provide to Contractor an exact copy of the applicable Owner Controlled Insurance Program manual together with the Contract Documents.

3.2 General- For Owners without OCIP.

3.2.1 The Contractor shall not commence work under the Contract until he has obtained the various

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insurances and bonds specified in this section and has submitted to the Owner certificates of insurance (and other evidence requested by Owner) evidencing his compliance with the various insurance requirements set forth in this Article.

3.2.1.1. Unless otherwise indicated in the Contract Documents, Contractor must, within ten (10) calendar days from the Notice of Award, provide to Owner, in form satisfactory to Owner as provided in detail in this Article, the following:

3.2.1.1.1. Performance Bond

3.2.1.1.2. Payment Bonds

3.2.1.1.3. Workmen's Compensation Insurance Policy issued by The Puerto Rico State Insurance Fund and all Social Insurances required by law.

3.2.1.1.4. General Liability Insurance

3.2.1.1.5. Business Auto Policy

3.2.1.1.6. Contract Works Policy (Builder's Risk)

3.2.1.1.7. Installation Floater Policy (when applicable)

4 3.2.2 Notwithstanding the requirements set forth in this Article, the Owner may opt out of part of the requirements included in this Article and require any and all other policies that it understands are needed for its particular construction projects, including other policies not required herein.

3.2.2.1. However, such decision to opt out of part of the requirements of this Article must be written and signed by the Owner stating particularly the reasoning behind it. Such written decision must be made part of Owner's Project file.

3.2.3. The insurance and bond policies required herein shall be obtained from insurance and surety companies complying with the requirements of Puerto Rico's Insurance Commissioner.

3.2.3.1. Prior to Bid announcement Date, Owner will publish a list of unacceptable insurance and bonding companies so that Contractor has knowledge of which companies are not authorized to provide insurances or bonds for the Work. Unless otherwise indicated in the Contract Documents, the Contractor must obtain an endorsement naming the Owner as an additional insured in each of the required insurance policies in this Article (as applicable).

3.2.4 The Contractor shall, throughout the performance of Work under the Contract and until the Final Acceptance of the Project, maintain current, and in effect all the required insurance, except the Contract Works Policy (Builder's Risk), which shall terminate on the date of Substantial Completion.

3.2.4.1. If on the termination date of any of the policies, the Project is still under construction and the Contractor has not renewed the policies, the Owner can renew them and deduct the amount paid for the premium, and applicable costs from the next payment, only if Contractor does not remedy and provide timely evidence of coverage.

3.2.5. Insurance coverage in the minimum limit amounts set forth herein shall not be construed to release the

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Contractor from liability in excess of such coverage limit. Contractor must give thirty (30) calendar days written notice to Owner before any policy coverage is changed, canceled or not renewed and shall cause the insurance carrier to do the same.

3.2.6 Acceptance of Insurance; Option to Replace. If either Owner or Contractor has any objection to the coverage afforded by or to other provisions of the insurance required to be purchased and maintained by the other party in accordance with this Article on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within twenty (20) days after receipt of the certificates of insurance and bonds (or other such evidence) required by Article 3.1.1.

3.2.6.1. Owner and Contractor shall each provide to the other such additional information with respect to insurance provided as the other may reasonably request.

3.2.6.2. If either party fails to purchase or maintain all of the insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure prior to the start of the Work, or of such failure is to maintain, prior to any change in the required coverage.

3.2.6.3. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent insurance to protect such other party's interest at the expense of the party who was required to provide such coverage, and a Change Order (or Extra Work Order in a unit price Contract) shall be issued to adjust the Contract Price accordingly.

3.2.7. If Owner finds it necessary or convenient to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in section 14.5 no such use or occupancy shall commence before the insurers providing the property insurance pursuant to section 3.6 have acknowledged notice thereof and in writing effected any changes in coverage needed thereby.

3.2.7.1. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

3.2.7.2. If the Owner accepts, occupies, or uses a portion, or portions, of the Work for its intended use, or whatever use he deems necessary or convenient, it is the Owner's responsibility to insure the property comprising said portion, or portions of the Work.

3.2.7.3. If the Contractor obtained the Contract Works Policy (Builder's Risk) for the Work, the Owner may request that Contractor continues to carry said insurance and will pay the cost, as a Change Order, based on the proportion of the occupied area versus the total Project area.

3.2.7.4. If requested by Contractor, the Owner shall supply copy of its insurance policy, and/or certificate of insurance evidencing that said portion, or portions, of the Work now under the Owner's care, custody and control is properly insured.

3.3 Performance, Payment, and Other Bonds

3.3.1. Unless otherwise stated in the Contract Documents, the Contractor must, within ten (10) calendar days from the date of Notice of Award, furnish and file with the Owner, in form satisfactory to, and with Sureties approved by the Owner, the following:

3.3.1.1. Performance Bond to guarantee the faithful performance of the Contract, in an amount equal to at least fifty percent (50%), but not more than one hundred percent (100%) of the Contract Sum, as stated in the Supplementary General Conditions of the Contract. If none is stated, the amount shall be one hundred percent

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(100%) of the Contract Sum.

3.3.1.2. Payment Bond, including Labor Bond in an amount equal to at least fifty percent (50%), but not more than one hundred percent (100%) of the Contract Sum, as stated in Supplementary General Conditions of the Contract. If none is stated, the amount shall be one hundred percent (100%) of the Contract Sum.

3.3.1.3. A separate and additional Payment Bond in an amount equal to the requirements of Law No. 111, approved June 22, 1961, as it may be amended in the future, payable to the Secretary of Labor of the Commonwealth of Puerto Rico to guarantee payment to laborers and employees of the Contractor.

3.3.1.4. Contractor shall also furnish such other Bonds as are required by the Contract Documents.

3.3.2. The Payment and Performance Bonds shall remain in effect as follows:

3.3.2.1. Under the Performance Bond: one (1) year after the date when the final payment becomes due for warranty work, as stipulated in the warranty clause, or as provided otherwise by Laws or Regulations or by the Contract Documents.

3.3.2.2. Under the Payment Bond: six (6) months after the retainage is paid in full to the Contractor, except as provided otherwise by Laws or Regulations or by the Contract Documents.

3.3.3 All Bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations. All Bonds must be signed by an attorney in fact duly authorized by the Commissioner of Insurance of Puerto Rico, and must be accompanied by a certified copy of such power of attorney.

3.3.4 If the Surety on any Bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of the Puerto Rico's Insurance Commissioner, Contractor shall within twenty (20) days thereafter substitute said Bond and Surety with acceptable substitutes.

3.4 Workmen's Compensation Insurance

3.4.1 The Contractor shall provide Worker's Compensation Insurance as required by the "Workers' Compensation Act of the Commonwealth of Puerto Rico". The Contractor shall furnish the Owner a certificate from the State Insurance Fund Corporation covered by the Workers' Compensation Act of the Commonwealth of Puerto Rico.

3.4.2 The Contractor shall also be responsible for compliance with said "Workers' Compensation Act" by all his subcontractors and agents.

3.5 Contractor's Liability Insurance

3.5.1 Contractor shall purchase and maintain the following liability insurance coverage, in an occurrence format, and other insurance as is appropriate for the Work being performed and will provide protection from claims set forth which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:

3.5.1.1. Limits. Unless otherwise stated in the Special Conditions of the Contract, the liability insurance limits shall not be less than:

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3.5.1.1.1. General Aggregate Limit	\$1,000,000
3.5.1.1.2. Products/Completed Operations Aggregate Limit	\$1,000,000
3.5.1.1.3. Personal and Advertising Injury Limits	\$ 500,000
3.5.1.1.4. Each Occurrence Limit	\$ 500,000
3.5.1.1.5. Fire Damage Limit	\$ 50,000
3.5.1.1.6. Medical Expense Limit	\$ 5,000

3.5.1.2. Claims for damages because of bodily injury, occupational sickness or disease, or death of any person other than Contractor's employees;

3.5.1.3. Claims for damages insured by reasonably available personal injury liability coverage which are sustained: (i) by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or (ii) by any other person for any other reason;

3.5.1.4. Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting there from.

3.5.2 The insurance policies so required by this section 3.4 to be purchased and maintained, unless otherwise specified in the Contract Documents, shall:

3.5.2.1. include at least the specific coverage and be written for no less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater,

3.5.2.2. include complete operations/premises/products insurance;

3.5.2.3. include contractual liability insurance covering Contractor's indemnity obligations under these General Conditions. Unless otherwise specified in the Contract Documents, the indemnity clause shall read as follows:

3.5.2.3.1. The Contractor for itself, agents, employees, successors and assigns agrees to save harmless the Owner, its Officers, Agents, Employees and Architect/Engineer from and against any and all claims, demands and/or suits, except as stated below, whether judicial or extra judicial for any cost whatever arising out or related to the execution of the Contract, and its insurers shall defend the Owner, its officers, agents, Employees and Architect/Engineer from such claims, demands and/or suits and shall bear all the expenses for such defense contemplated within the coverage limits provided by the Contractor's general liability policy, except where such claims, demands and/or suits are due solely to the negligence of the Owner, its Officers, Agents, employees and negligence, errors and/or omissions of the work performed by the Architect/Engineer.

3.5.2.4. include personal & advertising liability.

3.5.2.5 include XCU hazards (Explosion, Collapse, and Underground), as applicable.

3.5.2.6. include Contractor's subcontracted work;

3.5.2.7. include fire damage and medical expenses;

3.5.2.8. remain in effect at least until Final Acceptance and at all times thereafter when Contractor may be correcting, removing or replacing Work; in accordance with section 13.7 and

3.5.2.9. Include Employer's Liability - Stop Gap coverage with a minimum limit of five hundred thousand

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dollars (\$500,000.00) each personal occurrence and five hundred thousand dollars (\$500,000.00) each accident.

3.6 Business Auto Policy

3.6.1 Automobile Liability coverage shall be written to protect the Contractor against all claims for bodily injuries to members of the public and damage to property of others arising from the use of motor vehicles, and shall cover operations on or the site of all motor vehicles, whether they are owned, non-owned or hired.

3.6.2 Unless otherwise stated in the Contract Documents, the liability limits shall not be less than:

3.6.2.1. Bodily Injury: two hundred and fifty thousand dollars (\$250,000.00) each person and five hundred thousand dollars (\$500,000.00) each occurrence.

3.6.2.2. Property Damage: one hundred thousand dollars (\$100,000.00) each occurrence or two hundred and fifty thousand dollars (\$250,000.00) combined single limit for bodily injuries and property damage liability.

3.7 Contract Work-Builders Risk Insurance

3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide a Builder's Risk policy for the amount of coverage set in the Contract Documents. The Builders Risk policy will insure against property damage to the building or structure being constructed or erected during the course of construction.

3.7.1.1. The description of covered property should include all fixtures, materials and supplies to be used in or incidental to, the construction. It should also cover equipment, machinery, materials, etc., not yet installed but destined to become a permanent part of the structure, on the Site or at off Site temporary storage locations.

3.7.1.2. This insurance shall be written under an Inland Marine all risk form, including earthquake, windstorm and flood coverage and shall protect the Contractor, Subcontractors, and the Owner and shall contain a waiver of subrogation clause against the insured parties.

3.7.1.3. Coverage shall be for an amount equal to the Contract Sum, unless otherwise specified in the Contract Documents.

3.7.1.4. Coverage shall include expenses incurred in the repair or replacement of any insured property.

3.7.1.5. Coverage shall include materials and/or equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and/or equipment have been included in an Application for Payment recommended by Owner.

3.7.1.6. Coverage shall allow partial utilization of the Work by Owner, if Owner complies with Article 3.2.7, herein

3.7.1.7. Coverage shall include testing and startup.

3.7.1.8. Coverage shall be maintained in effect until Substantial Completion is achieved unless otherwise agreed to in writing by Owner and Contractor with thirty (30) days written notice to each other additional insured to whom a certificate of insurance has been issued.

3.7.1.9. Unless otherwise stated in the Contract Documents, flood coverage limits shall be for the Contract Sum or up to a maximum of \$250,000.00, whichever is lower.

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3.7.1.10. Deductibles under this Policy shall be no more than:

3.7.1.10.1. Flooding no more than \$5,000.00

3.7.1.10.2. For named windstorms, or hurricanes, no more than two percent (2%) of the Contract Sum.

3.7.1.10.3. For Earthquakes, no more than five percent (5%) of the total Contract Sum.

3.7.2. If the Contract Documents specify that Owner shall purchase the Builders Risk policy, said policy shall be under the same or better terms and conditions, than those indicated in section 3.6. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under this section 3.6, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order or Written Amendment.

3.7.2.1. Unless otherwise provided in the contract Documents, Owner shall be responsible for the deductible under this policy.

3.7.2.2. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.

3.7.3. The Contract Documents shall set forth, whenever applicable, which party shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will insure the interest of Owner, Contractor, and Subcontractors, each of whom is deemed to have an insurable interest and each shall be listed as an insured or additional insured. Unless otherwise set forth in the Contract Documents, said insurance, if needed, shall be purchased and paid for, by the Owner.

3.7.4. Receipt and Application of Insurance Proceeds

3.7.4.1. If Owner purchases said insurance, Owner is authorized and shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing to Owner's exercise of this power within fifteen (15) days after the occurrence of loss.

3.7.4.2. Owner shall settle with the insurers in accordance with what is agreed by the parties who own the insurable interest.

3.7.4.3. If no such agreement among the parties in interest is reached, Owner shall, on behalf of all parties, adjust and settle the loss with the insurers.

3.8 Installation Floater Policy

3.8.1. This policy shall be provided by the Contractor when Builders Risk policy does not apply and coverage is required for only a specific type of property during its installation.

3.8.2. The limit of insurance shall include the aggregate value of the Contractor's, Subcontractor's, or Owner's furnished equipment and materials to be erected or installed by the Contractor.

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3.8.3. This insurance shall be written under an Inland Marine all risk form, including earthquake, windstorm and flood coverage and shall protect the Contractor, Subcontractors, and the Owner and shall contain a waiver of subrogation clause against the insured parties.

3.9 Subcontractor's and Subcontractor's Liability Insurance.

3.9.1. Unless otherwise indicated in the Contract Documents, the Contractor shall, throughout the performance of Work under the Contract, procure and maintain in effect, and require all Subcontractors and others performing any such Work to procure and maintain in effect, insurance of the types applicable and with limits no less than the minimum amounts specified above, or insure the activity of his Subcontractors in his own policy.

3.10 Owner's Liability Insurance.

3.10.1 In addition to the insurance required to be provided by Contractor under Article 3.4, Owner, at Owner's option, may purchase and maintain Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

ARTICLE 4-SITE

4.1 Availability of Lands

4.1.1. Unless otherwise stated in the Contract Documents, Owner shall furnish the Site.

4.1.1.1. Owner shall notify Contractor of any known encumbrances or restrictions specifically related to use of the Site with which Contractor must comply in performing the Work.

4.1.1.2. Owner will obtain in a manner that does not adversely affect the critical path of the Work the easements for permanent structures or permanent changes to existing facilities.

4.1.1.3. If Contractor and Owner are unable to agree on the entitlement to or on the amount of any adjustment in the Contract Price or Contract Time, or both, as a result of any delay in Owner's complying with the responsibilities indicated above, Contractor may make a Claim therefore as provided in section 11.5.

4.1.2. Contractor shall secure and provide all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.2 Subsurface and Physical Conditions

4.2.1. Reports and Drawings. The Supplementary Conditions identify:

4.2.1.1. those reports of explorations and tests of subsurface conditions at or contiguous to the Site that Architect/Engineer has used in preparing the Contract Documents; and

4.2.1.2. those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that Architect/Engineer has used in preparing the Contract Documents.

4.2.2. Limited Reliance by Contractor on Technical Data Provided. On lineal type projects, Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are

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not part of the Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data", Contractor may not rely upon or make any Claim against Owner, Architect/Engineer, or any of Architect/Engineer's Consultants with respect to:

4.2.2.1. the completeness of such reports and drawings for Contractor's construction purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or

4.2.2.2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

4.2.2.3. any Contractor interpretation of, or conclusion drawn from, any "technical data" or any such other data, interpretations, opinions, or information.

4.2.3. Reliance by Contractor on Technical Data Provided. On building construction projects, Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, and such reports and drawings are part of the Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data", Contractor may not rely upon or make any Claim against Owner, Architect/Engineer, or any of Architect/Engineer's Consultants with respect to:

4.2.3.1. the completeness of such reports and drawings for Contractor's construction purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or

4.2.3.2. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.3 Differing Subsurface or Physical Conditions

4.3.1. Notice: If Contractor believes that any subsurface or physical condition at or contiguous to the Site that is uncovered or revealed either:

4.3.1.1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in section 4.2 is materially inaccurate; or

4.3.1.2. is of such a nature as to require a change in the Contract Documents; or

4.3.1.3. differs materially from that shown or indicated in the Contract Documents; or

4.3.1.4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents; then Contractor, shall promptly, in no event later than 3 working days, after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Article 6.16), notify Owner's Representative, Owner and Architect/Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

4.3.2. Architect/Engineer's and/or Owner's Representative Review. After receipt of written notice as required by the preceding Article, Architect/Engineer and/or Owner's Representative will promptly review the pertinent condition and determine the necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing of Architect/Engineer's and/or Owner's Representative findings and conclusions.

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4.4. Price and Time Adjustments

4.4.1. The Contract Price, or the Contract Time, or both will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's costs of, or time required for, performance of the Work; subject, however, to the following:

4.4.1.1. such condition must meet any one or more of the categories described in Article 4.3.1; and

4.4.1.2. with respect to Work that is paid for on a Unit Price Basis, any adjustment in Contract Price will be subject to the provisions of section 11.3.

4.4.2 Contractor shall not be entitled to any adjustment in the Contract Price or Contract Time if:

4.4.2.1. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner in respect of Contract Price and Contract Time by the submission of a Bid or by becoming bound under a negotiated contract; or

4.4.2.2. the existence of such condition could reasonably have been discovered or revealed as a result of any visual examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by Contractor prior to Contractor's making such final commitment; or

4.4.2.3. Contractor failed to give the written notice within the time and as required by Article 4.3.1.

4.4.3 If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price, or Contract Time, or both, a Claim may be made therefore as provided in section 11.5.

4.5 Underground Facilities

4.5.1. Shown or Indicated. The information and/or data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner's Representative, Owner or Architect/Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

4.5.1.1. Owner and Architect/Engineer shall be responsible for the reasonable accuracy or completeness of any such information or data; and

4.5.1.2. the costs of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:

4.5.1.2. 1. reviewing and checking all such information and data;

4.5.1.2.2. locating all Underground Facilities shown or indicated in the Contract Documents;

4.5.1.2.3. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and

4.5.1.2.4. the safety and protection of all such Underground Facilities and repairing any damage thereto

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resulting from the Work.

4.5.2. Not Shown or Indicated.

4.5.2.1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Article 14.13), notify said findings in writing to the owner of such Underground Facility, Owner's Representative and Architect/Engineer.

4.5.2.2. Architect/Engineer, Owner's Representative and Owner will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility.

4.5.2.3. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

4.5.2.4. If Owner's Representative concludes that a change in the Contract Documents is required, a Work Change Directive, Change Order or Extra Work Order will be issued to reflect and document such consequences.

4.5.2.4.1. An equitable adjustment shall be made to the Contract Price or Contract Time, or both, if warranted under this Article 4.5.

4.5.2.4.2. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Time, Owner or Contractor may make a Claim therefore as provided in section 11.5.

4.6. Reference Points

4.6.1. In projects requiring construction of buildings, at the beginning of the project, the Owner will set construction stakes establishing sufficient property lines, baseline and a bench mark. These stakes and marks will constitute all the surveying work the Owner will provide for the use of the Contractor. From the above-mentioned stakes and marks, the Contractor shall develop and establish all necessary marks and controls to perform his work. The Contractor will be held responsible for the preservation of original stakes and marks provided by the Owner at the beginning of the project, and if any of these stakes or marks are carelessly or willfully destroyed or disturbed by the Contractor, the cost of replacing them will be at Contractor's expense. The Owner will be responsible for the accuracy of the original lines and marks furnished to the Contractor.

4.6.1.1. In lineal projects, Owner shall provide engineering surveys to establish reference points for construction which, in Architect/Engineer's judgment, are necessary to enable Contractor to proceed with the Work.

4.6.2. Contractor shall be responsible thereafter for establishing the reference points and property monuments in accordance with the survey provided by Owner and laying out the Work, shall protect and preserve the reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall be responsible for replacing the established reference points and property monuments, if affected during construction.

4.6.3. Contractor shall report to Owner's Representative and Architect/Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

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4.7. Hazardous Environmental Condition at Site

4.7.1. Reports, Studies and Drawings. Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the Architect/Engineer in the Preparation of the Contract Documents.

4.7.2. Limited Reliance by Contractor on Technical Data Provided. On lineal type projects, Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not part of the Contract Documents. Such "technical data" is identified in the Technical Specifications. Except for such reliance on such "technical data", Contractor may not rely upon or make any Claim against Owner, Architect/Engineer, or any of Architect/Engineer's Consultants with respect to:

4.7.2.1. the completeness of such reports and drawings for Contractor's construction purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or

4.7.2.2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

4.7.2.3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.7.3. Reliance by Contractor on Technical Specifications Provided. On building construction projects, unless otherwise indicated in the Contract Documents, Contractor may rely upon the general accuracy of the "technical data" contained in such Technical Specifications and/or Plans and Drawings. Except for such reliance on such "technical data", Contractor may not rely upon or make any Claim against Owner, Architect/Engineer, or any of Architect/Engineer's Consultants with respect to:

4.7.3.1. the completeness of such reports and drawings for Contractor's construction purposes, including any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or

4.7.3.2. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.7.4. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site that was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work.

4.7.5. Contractor shall be responsible for Hazardous Environmental Conditions created due to any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.

4.7.6. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately:

4.7.6.1. at Owner's cost, secure or otherwise isolate such condition, if it is not the Contractor's fault; or at Contractor's cost, if it is his fault, or anyone for whom Contractor is responsible;

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4.7.6.2. stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by section 6.13 and 14.13); and

4.7.6.3. notify Owner's Representative, Owner and Architect/Engineer and promptly thereafter confirm such notice in writing, no later than 24 hours after the condition has been encountered. Failure to do so shall constitute a waiver of any claim in connection thereto.

4.7.6.3.1. Owner shall promptly consult with Architect/Engineer and/or Owner's Representative concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action.

4.7.7. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner's Representative has obtained any required permits related thereto and delivered to Contractor written notice:

4.7.7.1. specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or

4.7.7.2. specifying any special conditions under which such Work may be resumed safely.

4.7.7.3. If Owner, through Owner's Representative, and Contractor cannot agree as to entitlement to, or on the amount or extent, if any, of any adjustment in Contract Price or Contract Time, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefore as provided in Article 11.5.

4.7.8. If after receipt of such written notice, Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner's Representative may order the portion of the Work that is in the area affected by such condition to be deleted from the Work.

4.7.8.1. If Owner, through Owner's Representative, and Contractor cannot agree as to entitlement to, or on the amount or extent, if any, of an adjustment in Contract Price or Contract Time as a result of deleting such portion of the Work, then either party may make a Claim therefore as provided in Article 11.5.

4.7.8.2. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.

4.7.9. To the fullest extent permitted by Laws or Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and the officers, directors, partners, employees, agents, other consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition:

4.7.9.1. was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and

4.7.9.2. were not created by Contractor or by anyone for whom Contractor is responsible.

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4.7.9.3. Nothing in this Article shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

4.7.10. To the fullest extent permitted by Laws or Regulations, Contractor shall indemnify and hold harmless Owner's Representative, Owner, Architect/Engineer, Architect/Engineer's Consultants, and the officers, directors, partners, employees, agents, other consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible.

4.7.10.1. Nothing in this Article shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

4.7.11. The provisions of sections 4.2, 4.3 and 4.4 are not intended to apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5-OWNER

5.1 General

5.1.1. Owner's responsibilities and obligations are expressed throughout these General Conditions and are not limited to the ones contained in this Article.

5.1.2. All functions of the Owner will be performed by the Contracting Officer, unless delegated to others in the Contract Documents.

5.1.3. The Contracting Officer may delegate his full authority to another person, and to that effect shall notify the Contractor by written communication.

5.1.4. Unless otherwise specified in the Contract Documents, the person signing this Contract shall be interpreted to mean the Contracting Officer.

5.2 Information and Services Required of the Owner

5.2.1. The Owner shall furnish all available information describing the Project including, but not limited to, physical characteristics, legal limits and utility locations for the Project.

5.2.1.1. Said information should have been made available with reasonable time, and, unless otherwise specified in Bid Documents, prior to bid opening.

5.2.2. Before commencement of the Work, as specified in the Notice to Proceed, the Owner shall inform the Contractor in writing the name of the Owner's Infrastructure Area Director, Architect/Engineer, Contracting Officer, Owner's Representative and Project Inspector, if applicable. Owner reserves the right to change, from time to time, the designated persons or entities and any other designated representative who will perform the functions of the Owner. The Notice to Proceed shall also indicate the day of the week on which Contractor and Owner's Representative shall hold their weekly meeting to discuss matters related to the Project. The Owner's Representative may, from time to time, change said date of the week.

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5.2.3 Furnishing of Right of Way - The Owner will be responsible for obtaining the necessary rights-of-way in advance of construction. Any exceptions will be indicated in the Contract Documents.

5.2.4 Information or services to be provided by Owner shall be furnished by the Owner with reasonable promptness so as to avoid any delay in the orderly programmed progress of the Work.

5.3 Pay Promptly When Due

5.3.1. Owner shall make payments to Contractor promptly when they are due.

5.4 Owner's Right to Stop the Work

5.4.1. The Owner's Representative and/or Owner may in accordance with Article 15.1.2 order the Contractor to stop the Work, or any portion thereof if the Contractor:

5.4.1.1. fails to start (and expeditiously continues) correcting defective work promptly after Contractor is notified in writing by the Owner;

5.4.1.2. persistently fails to supply materials or equipment in accordance with the Contract Documents; or

5.4.1.3. for any other significant reason deemed necessary to insure the proper execution of the Contract until the cause for such order has been eliminated.

5.5 Owner's Right to Carry Out the Work Without Terminating the Employment of the Contractor

5.5.1. If the Contractor persistently neglects to carry out the Work in accordance with the Contract Documents or persistently fails to comply with any provision of the Contract, the Owner, through the Owner's Representative, may, after ten (10) days written notice to the Contractor and Surety, if any, and without prejudice to any other remedy he may have, perform said Work and/or, remedy such deficiencies.

5.5.1.1. In such case, an appropriate deduction for the cost of performing said Work and/or correcting such deficiencies shall be made from the payments then, or thereafter, due the Contractor. If the payments then, or thereafter, due the Contractor are not sufficient to cover such amount, the Contractor and/or surety shall pay the difference to the Owner.

5.5.2. The cost to be charged to Contractor of such Work, repairs or replacement, will be the actual cost incurred by Owner.

5.6 Owner's Right to Clean Up

5.6.1. If a dispute arises between the separate contractors in the Project as to their responsibility for cleaning up as required by these General Conditions, the Owner may, after written notice to Contractor, clean up and charge the cost thereof to the several contractors in the proportion that the Architect/Engineer, or the Owner's Representative, determines equitable. If the Contractor is not in agreement with the cost distribution, he may make a claim as provided in Article 11.5.

5.7 Evidence of Financial Arrangements

5.7.1. Upon Contractor's request, Owner will furnish Contractor reasonable evidence that financial arrangements have been made for the payment of Owners' obligations under the Contract, and that all documentation for said purpose has been filed pursuant to applicable Laws and Regulations.

5.7.1.1. If requested in writing by Contractor, Owner shall supply reasonable written evidence that Owner has complied with these requirements.

5.8 Limitations on Owner's Responsibilities

5.8.1. Unless otherwise provided in the Contract Documents the Owner, through Owner's Representative, shall have no authority over, nor responsibility for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or shall not be held responsible for any failure of Contractor to comply with Laws or Regulations applicable to the performance of the Work. Owner's Representative, or Owner, will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

ARTICLE 6 - CONTRACTOR

6.1 Supervision and Superintendence

6.1.1. Contractor shall supervise and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents.

6.1.1.1. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction, but Contractor shall not be responsible for the negligence of Owner or Architect/Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction, which is shown or indicated in and expressly required by the Contract Documents.

6.1.1.1.1. When the Contract Documents specify the use of a specific means, method, technique, sequence, or procedure of construction, which is shown or indicated in and expressly required by the Contract Document, such means, method, technique, sequence, or procedure of construction shall be used unless others are authorized by the Owner's Representative.

6.1.1.1.2. If the Contractor desires to use a means, method, technique, sequence, or procedure of construction other than specified in the Contract Documents, he shall request authority from the Owner's Representative to do so.

6.1.1.1.2.1. The request shall be in writing and shall include a description of the methods and equipment proposed and of the reasons for desiring to make the change.

6.1.1.1.2.2. If approval is given, it will be on the condition that the Contractor will be fully responsible for producing work in conformity with the Contract Documents.

6.1.1.1.2.3. If, after trial use of the substituted methods or equipment, the Owner's Representative determines that the Work produced does not meet Contract requirements, the Contractor shall discontinue the use of the substitute method or equipment and shall complete the remaining Work with the specified methods and

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equipment.

6.1.1.1.2.4. The Contractor shall remove the deficient Work and replace it with Work of specified quality, or take such other corrective action as the Owner's Representative may direct.

6.1.1.1.2.5. No change will be made in the Contract amount for the construction items involved or in Contract Time as a result of authorizing a change in methods or equipment under these provisions.

6.1.1.1.3. Contractor shall be responsible to ascertain that the completed Work complies accurately with the Contract Documents.

6.1.2. Project Manager. Unless otherwise indicated in the Contract Documents, the Contractor shall employ a competent licensed and collegiate architect or engineer, as the Project Manager, and necessary assistants to direct the Work. These assistants shall be in attendance at the project site at all times during the prosecution of the Work. The Project Manager shall be satisfactory to the Owner or his representatives and shall not be changed except with the consent of the Owner, unless the Project Manager proves to be unsatisfactory to the Contractor (and Contractor gives Owner written notice of the specific reason for removal as Project Manager) or ceases to be in Contractor's employ.

6.1.2.1. The Project Manager will be Contractor's representative at the Site and shall have authority to act on behalf of Contractor. The Contractor, prior to the start of the Project, will inform the Owner's Representative, if already assigned, or the Owner, if not assigned, the name, authority and responsibilities of the Project Manager and/or Superintendent.

6.1.2.1.1. All communications given or received from the Project Manager shall be binding on Contractor. All communications related to the Contract directed to the Contractor and/or proceeding from the Owner, Architect/Engineer, Owner's Representative and other representatives of the Owner shall be made thru the Project Manager.

6.2 Labor and Working Hours

6.2.1. Contractor shall provide competent, suitably qualified personnel to survey, layout, and construct the Work as required by the Contract Documents.

6.2.1.1. The Contractor shall at all times enforce strict discipline and good order among his employees and shall not employ in relation to the Project or the Work any unfit person or anyone not skilled in the task assigned to him.

6.2.1.1.1. The Contractor shall be responsible to the Owner for the acts and omissions of all of his employees and all subcontractors, their agents and employees and all other persons performing any work under a contract with the Contractor.

6.2.1.2. The Contractor shall, at all times, employ sufficient labor and equipment for prosecuting the Work to full completion in the manner and within the time required in the Contract Documents.

6.2.1.2.1. Workers engaged in special work or skilled work shall have sufficient experience in the performance of such work and in the operation of the equipment and tools to perform it properly and satisfactorily.

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6.2.1.2.2. Any person employed by the Contractor or by a subcontractor who, as determined by the Owner's Representative, does not perform his work in a proper and skillful manner, or is disrespectful, intemperate, disorderly or otherwise objectionable shall, at the written request of the Owner's Representative, be removed forthwith by the Contractor or Subcontractor employing such employee, and such person shall not be employed again on any portion of the Work without the written consent of the Owner's Representative. Owner's Representative shall specify, in writing, the reason for the removal of such person from the jobsite.

6.2.1.2.2.1. Should the Contractor fail to remove such person or persons as required herein, the Owner may withhold payment of estimates which are or may become due, or may suspend the Work by written notice until such orders are complied with.

6.2.2. Except as otherwise required for the safety or protection of persons or the Work or property at the Site, or adjacent thereto, or for completion of daily Work as provided in Article 9.1.2.2.2. or as otherwise stated in the Contract Documents, all Work shall be performed during regular working hours and Contractor will not permit overtime work or the performance of Work on Saturday, Sunday, or any legal holiday without Owner's Representative's written consent (which will not be unreasonably withheld).

6.2.2.1. The Contractor shall comply with all the applicable Federal and Commonwealth laws, rules and regulations concerning fair labor practices including minimum wages, work hours, equal employment opportunities, non-discrimination, civil rights, employment of minors, and other labor relation matters.

6.2.2.2. The Contractor shall pay weekly, in lawful money of the United States of America, including payment by check or direct deposit, the entire amount of wages, less legally authorized or mandated deductions, earned by each of the laborers and employees engaged in the work.

6.2.2.2.1. The Contractor shall make available the Project payrolls to the Owner's Representative for inspection and shall submit copies of such payrolls to the Owner's Representative when required.

6.2.2.2.1.1. Any irregularities noted in the Project's payrolls will be brought to the attention of the Contractor by the Owner's Representative for appropriate corrective action and payment of any pending wages. Should the Contractor fail to take the necessary action, he will be subject to such civil and criminal proceedings as provided by law and regulations.

6.2.2.2.1.2. Payment of wages to laborers and employees of the Contractor for their work shall have preference over the payment of other debts of the Contractor, except as otherwise established by law.

6.3 Services, Materials, and Equipment

6.3.1. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

6.3.2. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents.

6.3.2.1. All warranties and guarantees required by the Contract Documents shall expressly benefit Owner.

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6.3.2.2. If required by Owner's Representative, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

6.3.2.3. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise provided in the Contract Documents.

6.4 Progress and Other Schedules

6.4.1. Measurement and payment.

6.4.1.1. Unless otherwise specified in the Contract Documents, all costs in connection with the preparation and maintenance of schedules, workplans, submittals and other work specified in this Article 6.4 are to be included and form part of the project's general administrative expenses. Contractor's Cost for said work required in Article 6.4 shall not be paid as a separate pay item in Unit Price contracts or as a Schedule of Values item, in Lump Sum contracts.

6.4.2. General.

6.4.2.1. Progress schedules shall represent a practical plan to complete the Work within the Contract Time, and shall convey the Contractor's intent as to the manner of prosecuting the progress of the Work.

6.4.2.2. The scheduling and execution of construction in accordance with the Contract Documents are the responsibility of the Contractor. The Contractor shall involve and coordinate all Subcontractors and Suppliers in the development and updating of progress schedules.

6.4.2.3. The submittal of progress schedules shall be understood to be the Contractor's representation that the progress schedule meets the requirements of the Contract Documents and that the Work is expected to be executed in the sequence and duration indicated in the progress schedule.

6.4.3. Scheduling format.

6.4.3.1. The Project Schedule shall be computer produced using the Critical Path Method ("CPM") format. The schedule shall be computer generated utilizing an Owner approved project scheduling software, as indicated in the Contract Documents, such as Primavera, Microsoft Project, or SureTrak. The project scheduling software selected shall be used consistently from commencement to Final Acceptance of the Project. If the Contractor desires to use a project scheduling software other than the one specified in the Contract Documents, he shall request authorization from the Owner's Representative to do so, prior to the issuance of the Notice to Proceed. If the Contract Documents do not indicate a specific scheduling program, the Contractor may use any of the three mentioned herein, at his sole option.

6.4.3.2. The Project Schedule shall be updated monthly and submitted as indicated in Article 6.4.4. .

6.4.3.3. The schedule shall show Contract tasks, percent complete, progress bars, baseline schedules, milestones, start and finish dates, and other breakdowns as required by the Owner's Representative. The schedules shall show clearly the sequence of activities and shall list specifically the following activities:

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6.4.3.3.1. interim milestones completion dates. Phasing and staging of the Work as specified shall be prominently identified;

6.4.3.3.2. submittals and the Owner's Representative review of submittals;

6.4.3.3.3. acquisition of permits;

6.4.3.3.4. any long lead time (over 60 days) orders for material and equipment;

6.4.3.3.5. work to be performed by other contractors and agencies;

6.4.3.3.6. delivery of Owner's furnished equipment and materials indicated for incorporation in the Work.

6.4.3.4. Descriptions of scheduled activities shall include sufficient detail to identify the work that is to be accomplished.

6.4.3.4.1. The schedule shall contain sufficient activities to clearly show the sequence and interdependencies of the Work. The Owner's Representative may request that additional activities and information be added and from time to time may also require reasonable amendments to the schedule format that result in more clarity as to how the information is presented.

6.4.3.4.2. Activity durations shall be expressed in whole days. Work that is to be performed by Subcontractor shall be clearly defined.

6.4.3.4.3. Critical path activities are those activities with a total float equal to or less than zero. Schedules with negative total float may be found to be impractical by the Owner's Representative.

6.4.3.4.4. A schedule showing that Work that is completed in less than the completion time specified, shall be considered to have float. The float shall be the time between the scheduled completion of the Work and the Contract completion date. Float time shall not be for the exclusive benefit of either the Owner or the Contractor. Float shall be a resource available to both parties.

6.4.3.4.4.1. If according to the critical path of the originally approved Project Schedule any party that generates a float in said critical path, then said float shall belong exclusively to the party generating said float.

6.4.3.4.5. A schedule found to be impractical for the preceding reasons or any other reasons shall be revised by the Contractor and resubmitted.

6.4.4 Submittals.

6.4.4.1. Within thirty (30) days after the effective date of the Notice to Proceed (unless otherwise specified in the Contract Documents), Contractor shall submit to Owner's Representative for its timely review:

6.4.4.1.1. a preliminary progress schedule indicating the times (numbers and days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;

6.4.4.1.2. a preliminary schedule of Shop Drawings and Sample submittals which will list each required submittal and the times for submitting, reviewing, and processing such submittal; and

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6.4.4.1.3. a preliminary schedule of values for all of the Work, as specified on Article 13, herein.

6.4.4.2. Submit one (1) electronic copy and the number of hard copies of the Submittals required in Article 6.4 which the Contractor requires to be returned, plus three (3) hard copies which will be retained by the Owner.

6.4.4.3. Schedule submittals will be reviewed by the Owner's Representative, and shall be updated and revised as indicated in section 6.4.6. Re-submittals shall conform to the same requirements as original submittals.

6.4.4.4. The Contractor shall prepare and submit all schedules and schedule analysis reports in electronic as well as hard copies.

6.4.4.5. All progress schedule submittals are subject to review and approval by the Owner's Representative.

6.4.4.5.1. Unless otherwise provided in the Contract Documents, at least ten (10) days before submission of the Application for Payment, a conference, to be attended by Contractor, Owner's Representative, Architect/Engineer, and others as appropriate, will be held to review for purposes of acceptability to Owner's Representative, as provided below, the progress schedules submitted in accordance to Article 6.4.4.1. If said meeting is not held, for reasons other than due to the fault of the Contractor, or if the Owner's Representative does not provide timely approval, or corrections, to the submitted submittals specified in Article 6.4.1., all the previously submitted submittals shall be considered approved, provided Contractor has given notice directly to Owner as required in Article 17.3.2.

6.4.4.5.1.1. Contractor shall have an additional ten (10) days to make corrections and adjustments and to complete and resubmit the schedules. Owner's Representative shall approve said corrections within a period of ten (10) days from the date of re-submittal otherwise they shall be considered approved, provided Contractor has given notice directly to Owner as required in Article 17.3.2.

6.4.4.5.1.1.1. The third progress payment shall not be paid to Contractor until acceptable schedules are submitted to Owner's Representative, or until schedules are considered approved as specified herein.

6.4.4.5.1.1.2. The Progress Schedule will be acceptable to Owner's Representative if in accordance with the Agreement it provides an orderly progression of the Work to completion within any specified Milestones and the Contract Time.

6.4.4.5.1.1.3. Contractor's schedule of Shop Drawings and Sample submittals will be acceptable to Owner's Representative if it provides, in Owner's sole discretion, a workable arrangement for reviewing and processing the required submittals.

6.4.4.6. The first schedule submitted by the Contractor will be reviewed for format, as well as content. The Owner's Representative may request format changes. Once the format has been approved, all subsequent schedules shall be submitted in the approved format.

6.4.5 Four-week work plan.

6.4.5.1. A schedule in calendar time-scaled bar chart format depicting the Contractor's intended work activities for the upcoming four (4) week period shall be submitted on a monthly basis and shall be due on the day of the project's weekly meeting. Each activity of one (1) day or more in duration shall be indicated.

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6.4.5.2. Any deviations, such as sequences of work, timing, and durations of activities from the approved Project Schedule, shall be noted and explained in writing.

6.4.5.3. The four (4) week work plan shall be submitted on sheets not less than 8 ½ inches by 11 inches, or as approved by the Owner's Representative.

6.4.6. Review, updates and revisions

6.4.6.1. The Owner's Representative will review and return to Contractor the schedule submittals, with written comments, within the following deadlines counted from the date of receipt.

6.4.6.1.1. Project CPM schedule: 14 calendar days.

6.4.6.1.2. Four (4) week work plan: 8 calendar days.

6.4.6.2. The Contractor shall make all corrections to the Project Schedule requested by the Owner's Representative and resubmit the schedule for approval. If the Contractor does not agree with the Owner's Representative's comments, the Contractor shall provide written notice of disagreement within five (5) days from the receipt of the Owner's Representative's comments. The Owner's Representative's comments on the four (4) week work plan for which the Contractor disagrees shall be resolved in a meeting held for that purpose, if necessary.

6.4.6.3. At least once each month, or often if indicated in the Contract Documents, the Contractor shall submit an updated schedule showing the progress of the Work to date and anticipated activities to be worked on. All updated schedules must comply with Article 6.4.

6.4.6.4. If, according to the approved Project Schedule, the Contractor is thirty (30) or more days behind as to the completion date of any milestone, or the schedule contains thirty (30) or more days of negative float, considering all approved time extensions, the Contractor shall submit a revised schedule, showing a practical plan to complete the Work within the Contract Time.

6.5 Submittals for Approval, Substitutes and/or "Equals"

6.5.1. Submittal for Approval of Materials, Shop Drawings and Samples; Plans and Working Drawings; As-Built Plans.

6.5.1.1. The Contractor shall submit all submittals for approvals of Materials, Shop Drawings and Samples to the Owner's Representative. The Owner's Representative will either perform the review and approval, or forward the Contractor's submittal to the Architect/Engineer's for his review and approval, in accordance with the accepted itinerary for Shop Drawings and Sample submittals.

6.5.1.2. All submittals will be identified as required by Owner's Representative and presented with the number of copies specified in the Contract Documents. If a number is not mentioned, seven (7) copies will be submitted. Of these seven (7) copies, four (4) shall be returned, duly evaluated, to the Contractor.

6.5.1.3. The data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Owner's Representative the services, materials, and equipment Contractor proposes to provide and to enable Owner's Representative to review the

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information for the limited purposes of complying with the requirements of Article 6.17.

6.5.1.4. The Architect/Engineer or the Owner's Representative shall have the following deadlines within which to approve, request additional information or reject any Submittal for Approval of Materials, Shop Drawings and Samples:

6.5.1.4.1. For Materials, Shop Drawings or Samples which are the ones specified in the Contract Documents or are, in the opinion of the Owner's Representative, non-complex Shop Drawings or Materials, the Architect/Engineer or Owner's Representative shall have a period of ten (10) working days.

6.5.1.4.2. For Materials, Shop Drawings or Samples not complying with the requirements indicated in the previous Article, the period shall be twenty (20) working days.

6.5.1.4.3. If no comment by the Architect/Engineer or Owner's Representative is made within said period of time, the Contractor will have the right to Claim if said delay impacts the critical path.

6.5.1.4.4. The above mentioned deadlines can be extended if requested in writing by the Architect/Engineer and/or Owner's Representative as long as approval is made within a time period that does not alter the critical path. Such request for extension shall not be unreasonably denied.

6.5.1.5. Each Sample will be identified clearly as to material, supplier, pertinent data such as catalog numbers, and the use for which it is intended or otherwise as Owner's Representative may require, to enable the Architect/Engineer or the Owner's Representative to review the submittal for the limited purposes of complying with the requirements of Article 6.17.

6.5.1.5.1. The numbers of items each Sample to be submitted will be as specified in the Specifications. If no number of items is mentioned, three (3) samples will be submitted. Of these, three (3) samples, two (2) shall be returned, duly evaluated, to the Contractor.

6.5.2. Where an approval of Materials, Shop Drawing or Samples is required by the Contract Documents or the schedule of Shop Drawings and Sample submittals, any related Work performed, including materials purchases, prior to Owner's Representative or Architect/Engineer's review and approval of the pertinent submittal will be at the sole responsibility of Contractor.

6.5.3. Submittal Procedures.

6.5.3.1. Before delivering each submittal for approvals of Material, Shop Drawing or Sample, Contractor shall have:

6.5.3.1.1. verified that all shop drawing measurements, quantities, shop drawing dimensions, specified performance criteria, installation requirements, materials, catalog numbers, and similar information are in accordance with the Contract Documents and if not in accordance, ascertained that all variations are indicated in the submittal;

6.5.3.1.2. verified all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;

6.5.3.1.3. verified all information relative to means, methods, techniques, sequences, and procedures of construction and safety precautions and programs incident thereto; and

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6.5.3.1.4. Contractor shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings or Samples and with the requirements of the Work and the Contract Documents.

6.5.3.2. Each submittal shall bear a stamp or specific written indication that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal. If required in the Special Conditions, submittals for Materials and Samples must bear a notarized certificate of compliance.

6.5.3.3. At the time of each submittal, Contractor shall give Owner's Representative specific written notice of such variations, if any, that the submittal for approvals of material, Shop Drawing or Sample submitted may have from the requirements of the Contract Documents, such notice to be in a written communication included with the submittal.

6.5.4. The Architect/Engineer or Owner's Representative's Review.

6.5.4.1. Owner's Representative, either himself or through the Architect/Engineer, will perform a timely review, evaluation and comment of Shop Drawings and Samples in accordance with the schedule of Shop Drawings and Sample submittals acceptable to Owner's Representative. If no comment by the Owner's Representative is made within the time stated in this Article 6.5 the Contractor will have the right to claim pursuant the provisions of Article 11.5, if said delay impacts the critical path.

6.5.4.1.1. The Architect/Engineer or the Owner's Representative review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

6.5.4.1.2. The Architect/Engineer or the Owner's Representative's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto.

6.5.4.1.2.1. The review and approval of a separate item, as such, will not indicate approval of the assembly in which the item functions.

6.5.4.1.3. The Architect/Engineer or the Owner's Representative's review and approval of Shop Drawings or Samples shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has in writing called the Architect/Engineer or the Owner's Representative attention to each such variation at the time of each submittal as required by Article 6.17 and the Architect/Engineer or the Owner's Representative has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample approval; nor will any approval by the Architect/Engineer or the Owner's Representative relieve Contractor from responsibility for complying with the requirements of Article 6.17.

6.5.5. Re-submittal Procedures.

6.5.5.1. Contractor shall make corrections required by the Architect/Engineer or the Owner's Representative and shall return the required copies of materials submittals, the required number of corrected copies of Shop Drawings and submit as required new Samples for review and approval.

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6.5.6 Substitutes and "Or-equals".

6.5.6.1. Whenever an item or material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Owner's Representative for review under the circumstances described below. The Contractor will present his submittal for approval, indicating whether the item of material or equipment proposed is an Or Equal or a Substitute.

6.5.6.2. "Or-Equal" Items: If in Owner's Representative's sole discretion an item, or material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it will be considered by Owner's Representative as an "or-equal" item, in which case review and approval of the proposed item be accomplished without compliance with the special requirements for approval of the proposed substitute items and be acceptable or acceptable with comments. Owner's Representative's basis for rejection of the item of material or equipment as an "or equal" material shall be written and may be subject to appeal, as specified in Article 11.5 of these General Conditions, by Contractor. For the purposes of this Article, a proposed item of material or equipment will be considered functionally equal to an item so named if:

6.5.6.2.1. In the exercise of reasonable judgment, Owner's Representative determines that:

6.5.6.2.1.1. it is at least equal in quality, durability, appearance, strength, and design characteristics;

6.5.6.2.1.2. it will reliably perform at least equally well the function imposed by the design concept of the completed Project as a functioning whole, and;

6.5.6.2.2. Contractor certifies that:

6.5.6.2.2.1. there is no increase in cost to the Owner; and

6.5.6.2.2.2. it will conform substantially, even with deviations, to the detailed requirements of the item named in the Contract Documents.

6.5.6.2.2.3. Owner's Representative shall make the decision on the "or equal" material with sufficient time so as not to alter the Contractor's Programmed Schedule of the Work. If no comment by the Owner's Representative is made within said period of time, the Contractor will have the right to Claim pursuant the provisions of Article 11.5 if said delay impacts the critical path.

6.5.6.3. Substitute Items

6.5.6.3.1. If in Owner's Representative's sole discretion an item or material or equipment proposed by Contractor does not qualify as an "or-equal" item under Article 6.5.6, it will be considered a proposed substitute item.

6.5.6.3.2. Contractor shall submit sufficient information as provided below to allow Owner's Representative to determine that the item or material or equipment proposed is essentially equivalent to that specified and an acceptable substitute therefore.

6.5.6.3.2.1. Requests for review of proposed substitute items, material or equipment will not be accepted by

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Owner's Representative from anyone other than Contractor.

6.5.6.3.3. The procedure for review by Owner's Representative will be as set forth in Article 6.5.6, as supplemented in these General Conditions and as Owner's Representative may decide is appropriate under the circumstances.

6.5.6.3.4. Contractor shall first make written application to Owner's Representative for review of a proposed substitute item, material or equipment that Contractor seeks to furnish or use.

6.5.6.3.4.1. The application shall certify that the proposed substitute item will perform adequately the functions and achieve the results called for by the general design, be similar in substance to that specified, and be suited to the same use as that specified.

6.5.6.3.4.2. The application will state the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's timely achievement of Substantial Completion, whether or not use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for work on the Project) to adapt the design to the proposed substitute item and whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.

6.5.6.3.4.3. All variations of the proposed substitute item from that specified will be identified in the application, and available engineering, sales, maintenance, repair, and replacement services will be indicated.

6.5.6.3.4.4. The application will also contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change, all of which will be considered by Owner's Representative in the evaluation of the proposed substitute item.

6.5.6.3.4.5. Owner's Representative may require Contractor to furnish additional data about the proposed substitute item.

6.5.6.3.5. Owner's Representative shall make the decision on the "substitute" material with sufficient time so as not to alter the critical path. If no comment by the Owner's Representative is made within said period of time, the Contractor will have the right to Claim pursuant the provisions of Article 11.5 if said delay impacts the critical path.

6.5.6.3.6. Owner's Representative's basis for rejection of a "substitute" material shall be written and may be subject to appeal and Claim by Contractor, as specified in Article 11.5.

6.5.6.4. If a Substitute item is approved by the Owner and such change affects the Contract Price, then the Contract Price shall be equitably adjusted.

6.5.7. Substitute Construction Methods or Procedures.

6.5.7.1. If a specific means, method, technique, sequence, or procedure of construction is shown, or indicated in, or expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Owner's Representative.

6.5.7.1.1. Contractor shall submit sufficient information to allow Owner's Representative, in Owner's

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Representative's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. Such submittal shall be made with sufficient time as to allow the Owner's Representative to review it.

6.5.7.1.1.1. The procedure for review by Owner's Representative will be similar to that provided in section 6.5.6 but no Claim may be made by contractor due to untimely evaluation by Owner.

6.5.8. Owner's Representative's Evaluation.

6.5.8.1. Owner's Representative or Architect/Engineer will be allowed a reasonable time, which will not unreasonably delay the critical path of the Work, within which to evaluate each proposal or submittal made pursuant to Article 6.5.

6.5.8.2. Except as provided above. Owner's Representative will be the sole judge of acceptability.

6.5.8.3. No "or-equal" or substitute will be ordered, installed or utilized until Owner's Representative's review is complete, which will be evidenced by written approval by Owner for a substitute or an approved Shop Drawing or an "or-equal."

6.5.8.4. Owner's Representative will advise Contractor in writing of any negative determination.

6.5.8.5. Owner's Representative will charge Contractor for any overtime expenses and other costs incurred in the evaluation of a proposed substitute, similar, or equal materials, unless said proposal was submitted by Contractor with reasonable time as to afford the Owner the time necessary to analyze the submittal without affecting the Project Schedule.

6.5.9. Special Guarantee.

6.5.9.1. Owner's Representative may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

6.5.10. Contractor's Expense.

6.5.10.1. Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.5.11. Approval of Submittals.

6.5.11.1. If within the periods of time provided under this Article 6 for approval of submittals made by the Contractor, the Owner's Representative fails to render his decision as to any submittal and the critical path is adversely affected, the Contractor shall require in writing the approval of the Owner's Representative, who shall have ten (10) working days to issue his decision. If no decision is forthcoming from the Owner's Representative within the stated time, for reasons other than due to the fault of Contractor, the submittal shall be considered approved, provided Contractor has also given the same timely notice directly to Owner required in Article 17.3.2

6.6 Review of Contract Documents

6.6.1. The Contractor shall carefully study and compare the Contract Documents with each other and with

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information furnished by the Owner and shall at once report to the Owner, Architect/Engineer, and Owner's Representative any error, inconsistency or omission he may discover.

6.6.1.1. The Contractor shall not be liable to the Owner for any errors, inconsistencies or omissions in the Contract Documents.

6.6.1.2. The Contractor shall not take advantage of any such errors, inconsistencies, or omissions.

6.6.1.3. The Owner's Representative after being notified by the Contractor of such errors, inconsistencies or omissions will make the corrections and interpretations deemed necessary for fulfilling the intent of the Contract Documents, within a reasonable time so as not to alter the programmed progress of the Work. If no comment by the Owner's Representative is made within said time the Contractor will have the right to Claim pursuant the provisions of Article 11.5 if said delay impacts the critical path.

6.7 Patent, Fees and Royalties

6.7.1. Contractor shall pay all license fees and royalties and assume all costs incident to the use, in the performance of the Work or the incorporation in the Work, of any invention, design, process, product, or device which is the subject or patent rights or copyrights held by others.

6.7.2. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of Owner or Architect/Engineer its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.

6.7.3 To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner, Architect/Engineer, Architect/Engineer's Consultants, and the officers, directors, partners, employees or agents, and other consultants of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.8 Permits

6.8.1. Unless otherwise indicated in the Contract Documents, the responsibilities for securing and paying for permits, governmental fees and licenses for work to be performed are as follows:

6.8.1.1. To obtain the Construction Permit, the Contractor shall pay the premiums to secure the State insurance Fund policy and the Municipal Construction Taxes, at the rate that is in effect at bid date, unless the Contractor is explicitly not obligated to pay said taxes under the terms and provisions of the Contract Documents, in which case, shall so be specifically stated in the Contract Documents. The Owner shall secure all the Architect or Engineer's and Owner's Representative's certificates necessary and pertinent needed to secure the Construction Permit as well as submit applications and secure the permits for the Plan CES and for the Federal Storm Water Drainage plan, if same is required for the Project.

6.8.1.2. To obtain the Use Permit, the Contractor shall secure the endorsements required for said Use Permit from all government agencies, unless one or more of these cannot be obtained due to circumstances beyond the control of the

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Contractor. The Owner must ascertain that the reports required for the Use Permit from the Architect or Engineer and Owner's Representative are duly filed with "Oficina de Gerencia de Permisos" and must also obtain any of the above mentioned endorsements that cannot be obtained due to circumstances beyond the control of Contractor.

6.8.1.3. All payments due, or to become due, to any agency, public or private, for connection to, or improvement of any of said agencies' infrastructure (Impact Fees) shall be paid by the Owner with sufficient time so as not to adversely affect the critical path of the Work.

6.8.1.4. The Contractor shall secure and pay for all incidental permits required for the completion of the Work, unless such incidental permits deviate from the normal procedures, or costs, of the requiring agency and shall do so in a timely manner so as not to adversely affect the critical path of the Work.

6.8.1.5. Any other fees or charges related to permitting to be paid by the Contractor will be indicated in the special conditions.

6.8.1.6. The duties of Owner and of Contractor stated in this Article 6.8 shall be performed in a timely manner as to not adversely affect the critical path of the Work.

6.9 Laws and Regulations

6.9.1. Contractor shall give all notices and comply with all Laws and Regulations applicable to the performance of the Work.

6.9.1.1. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner, nor Owner's Representative nor Architect/Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

6.9.1.2. Should the Contractor observe that the Contract Documents are at variance with any Federal, Commonwealth and Municipal laws, ordinances, rules, regulations, by-laws, and all orders or decrees, he shall promptly notify the Owner's Representative in writing and the Owner's Representative shall instruct the Contractor, also in writing, as to how Contractor is to proceed. Any additional cost and /or extra time incurred by the Contractor to comply with Laws and Regulations enacted after the bid opening date, it may file a claim for equitable adjustment of the Contract Price or the Contract Time or both, as shall any decrease in cost or time resulting therefrom.

6.9.1.3. If the Contractor performs any work knowing it to be contrary to Federal, Commonwealth and Municipal laws, ordinances, rules, regulations, by-laws, orders or decrees, the Contractor shall assume full responsibility therefore, and shall bear all cost arising there from.

6.9.1.4. The Contractor shall save the Owner and its authorized representatives harmless from any claim or liability arising from or based on the infraction or violation of any such laws, ordinances, rules, regulations, by-laws, all orders or decrees, except if the infractions or violations are caused by acts of the Owner, or of Owner's authorized representatives.

6.9.1.5. If Contractor performs any Work knowing or having reason to know that he is acting contrary to said Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred as a consequence thereof. It shall not be Contractor's primary responsibility to make certain

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that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not release Contractor of Contractor's obligations hereunder.

6.10 Taxes

6.10.1. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work and which were in effect at the bid opening date.

6.10.1.1. Among said taxes, the Contractor shall pay the municipal construction taxes applicable to the Project in a timely fashion, but no later than fifteen (15) calendar days after the first partial (certification) payment is made by the Owner to Contractor.

6.10.1.2. If specifically stated in the Contract Documents, the Municipal Construction tax rate may be determined between Owner and the municipal government where the project is to be located, in such case a specific rate shall be established by the mayor and the municipal legislature, and notified to the Contractor before bid time. If no such rate is indicated in the Contract Documents regarding such arrangement between Owner and the municipal government, then the Contractor shall pay at the rates prevailing at the time of the bid.

6.10.1.1.1. The Contractor shall furnish and deliver to the Owner written evidence that said payment(s) was made before the second partial (certification) payment is made by the Owner to Contractor.

6.10.1.1.2. In case that the Contractor does not furnish and deliver said evidence of payment, the Owner shall deduct from said partial (certification) payments the undisputed amount of municipal tax plus any penalties and fines and pay it directly to the municipality.

6.10.1.1.2.1. If the amount of the second partial (certification) payment is not enough to cover the total amount of the municipal tax, the Owner shall continue to deduct from the following partial (certification) payments until the undisputed amount is paid in full.

6.10.1.1.2.2. The direct payment provided for in Article 6.10.1.1.2 shall be effected after the retainage required in Article 13.2.2 is deducted.

6.11 Use of Site and Other Areas

6.11.1. Limitation on Use of Site and Other Areas.

6.11.1.1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment.

6.11.1.1.1. Contractor shall assume full responsibility for any damage to any such land or area, or to the Owner or occupant thereof, or of any adjacent land or areas, resulting from the performance of the Work.

6.11.1.1.2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly resolve the dispute with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

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6.11.1.1.3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold Owner, Architect/Engineer, Architect/Engineer's Consultant, and the officers, directors, partners, employees, agents, and other consultants of each and any of them harmless from and against all claims, costs, losses, and damages (including but not limited to all fees and charges or engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Architect/Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

6.11.2. Removal of Debris during Performance of the Work.

6.11.2.1. During the progress of the Work, Contractor shall keep the Site and other areas free from excessive accumulations of waste materials, rubbish, and other debris caused by his operations on the Site.

6.11.2.1.1. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

6.11.3. Cleaning.

6.11.3.1. Prior to Substantial Completion of the Work Contractor shall clean the Site and make it ready for utilization by Owner.

6.11.3.1.1. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

6.11.3.1.1.1. If the Contractor fails to clean up as indicated above, the Owner may do so and the cost thereof shall be charged to the Contractor.

6.11.4. Loading Structures.

6.11.4.1. Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.11.4.2. Owner's Representative shall not permit any of the Owner's Other Contractors, his personnel, or any other entity performing work for him directly at the Site, to load any part of any structure in any manner that will endanger the structure, nor shall Owner's Representative subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.11.5. Rights To and Use of Materials Found On the Work.

6.11.5.1. The Contractor, with the prior written approval of the Owner's Representative, may use to perform the Work materials obtained from existing structures at the Site which are to be removed that are determined by the Owner's Representative to be acceptable for a use approved in writing by Owner's Representative.

6.11.5.2. Unless otherwise provided in the Contract Documents, material from any existing structures to be removed may be used temporarily by the Contractor in the erection of new structures.

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6.11.5.2.1. If the material is to be salvaged for the Owner, its modification will not be permitted except as approved by the Owner's Representative.

6.11.5.2.2. Unless otherwise specified in the Contract Documents, all soil existing at the Project Site will be considered fit to be used as fill in the performance of the Work if such soil meets the Project's field fill criteria.

6.12 Record Document

6.12.1. Contractor shall maintain in a safe place at the Site one (1) record copy of all Drawings, Specifications, Addenda, Written Amendments, Change Orders, Extra Work Orders, Work Change Directives, Field Orders, permits, and written interpretations and clarifications in good order and annotated showing changes made during construction.

6.12.1.1. Said documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Architect/Engineer and the Owner's Representative.

6.12.1.2. If not previously submitted, prior to Final Acceptance, said documents, Samples, and Shop Drawings will be delivered to Owner's Representative for delivery to Owner.

6.13 Safety and Protection

6.13.1. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

6.13.1.1. all persons on the Site or who may be affected by the Work;

6.13.1.2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and

6.13.1.3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

6.13.2. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection.

6.13.2.1. Contractor shall notify owners of adjacent property and of Underground Facilities and utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.

6.13.2.2. All damage, injury, or loss to any property referred to in Articles 6.13.1.2 or 6.13.1.3 caused, directly or indirectly, in whole or in part, by Contractor any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Architect/Engineer or Architect/Engineer's Consultant, or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or

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indirectly employed by any of them).

6.13.2.3. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Owner's Representative has issued a notice to Owner and Contractor of Final Acceptance of the Work (except as otherwise expressly provided in connection with Substantial Completion).

6.13.3. If so provided in the bid documents, the Owner has the right to establish any reasonable monetary penalties for violations of this Section 6.13.

6.14 Safety Representative

6.14.1. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs. The safety representative at the Site may have other duties assigned to him.

6.15 Hazard Communication Programs

6.15.1. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available at the Site in accordance with Laws or Regulations.

6.16 Plans and Working Drawings; As-Built Plans.

6.16.1. Plans and Working Drawings.

6.16.1.1. The detail Plans and Specifications for the Project have been prepared by licensed and collegiate competent Architect/Engineer exercising reasonable care and are intended to show as clearly as is practicable the Work required to be performed. Contractor will rely on the accuracy of said drawings, specifically in their compliance with all applicable codes and regulations in effect on the bid opening date.

6.16.1.1.1. The Contractor realizes, however, that construction details cannot always be accurately anticipated and that in executing the Work, field conditions may require reasonable minor modifications in the details of plans and quantities of Work.

6.16.1.1.1.1. Therefore, all Work must be carried out taking into account the mentioned considerations as well as field conditions, to the satisfaction of the Owner's Representative, and in accordance with his instructions and with the Contract Documents.

6.16.2 Working Drawings

6.16.2.1. The Plans will be supplemented by such Working Drawings as are necessary to adequately control the Work.

6.16.2.2. Working Drawings for structures shall be furnished by the Contractor and shall consist of such detailed Plans as may be required to adequately control the Work and to complement the Plans furnished by the Owner.

6.16.2.3. They shall include, among others, stress sheets, shop drawings, erection plans, false work plans,

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cofferdam plans, bending diagrams for reinforcing steel or any other supplementary plans or similar data required of the Contractor.

6.16.3. Working Drawings and related documents submitted for manufactured and shop-fabricated products shall be accompanied by a certification from the manufacturer that the materials and/or equipment meet all the requirements of the Specifications.

6.16.3.1. In the event that any item is not exactly in accordance with the requirements of the Plans and Specifications, the certificate shall identify and explain each such difference.

6.16.4. Unless otherwise indicated, all Working Drawings are subject to review and acceptance by the Owner's Representative.

6.16.4.1. Such review and acceptance shall not release the Contractor from any of his responsibilities for the safe and successful completion of the Work.

6.16.4.2. The cost of preparing and furnishing all required Working Drawings is included in the Contract Price and no separate payment will be made for such Drawings.

6.17 As Built Record Drawings

6.17.1. The Contractor shall keep at the Site a copy of the Drawings marked in a neat manner that record all changes made during construction.

6.17.1.1. The set of provisional record Drawings shall be kept up to date and submitted for the inspection and approval of the Owner's Representative, at least five (5) days prior to any partial monthly payment, unless otherwise required in the Contract Documents.

6.17.2. Prior to Final Acceptance, the Contractor shall deliver the as built Drawings to the Owner's Representative.

6.17.2.1. These Drawings will be used as the draft for the preparation of the final As Built Drawings for the Project by Architect/Engineer.

6.17.3. The Architect/Engineer will, with the full cooperation of Contractor and of the Owner's representative prepare final as-built record drawings in reproducible form as reasonably required by Owner, to be delivered to the Owner.

6.17.3.1. The Owner will cause the Architect/Engineer to submit, with enough time so as not to adversely alter the critical path of the Work, the revised as-built drawings to the required governmental entities and obtain the approval of an amended Construction Permit, if same is required, and deliver the same to Owner and Contractor. This amended Construction Permit will be used to obtain the Use Permit for the project.

6.18 Notice to Proceed.

6.18.1. After the Agreement has been executed, the Contractor will be formally notified to proceed with the Work or service provided in the Contract Documents.

6.18.1.1. The Notice to Proceed will stipulate the date on which Owner expects the Contractor will begin construction and the date on which Contract Time will commence to run.

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6.18.1.2. Pre-Construction Conference.

6.18.1.2.1. Prior to the start of the Project the Owner will summon all interested parties to a Pre-construction Conference in order to organize the start of the work and other matters. If no such conference is summoned by the Owner, and in any event, the Contractor may start the Work on the date stated in the Notice to Proceed.

6.18.2. Prosecution and Progress.

6.18.2.1. After obtaining written permission issued by the Owner, the Contractor may assemble materials and equipment and start preliminary Work as soon as he is notified of the award, but no responsibility for acceptance and payment of the Work so performed shall be assumed by the Owner until and unless the Contract has been executed and the order to proceed issued.

6.18.2.2. The rate of progress in the prosecution of the Work shall be compared in accordance with Articles 4.2 and 4.3 with approved Progress Schedule as the Work progresses.

6.18.2.2.1. If the Contractor is at fault for falling thirty (30) working days or more behind the approved schedule or ten percent (10%) of Contract Time, whichever is less, Contractor shall submit a revised schedule for completion of the Work within the Contract Time and modify his operations, including, but not limited to, working overtime and on Saturdays, Sundays and legal holidays, to providing such additional materials, equipment and labor as necessary to comply with the revised schedule. Any additional cost caused by the modified schedule will be at Contractor's expense.

6.18.2.3. Should the prosecution of the Work be discontinued for any reason, the Contractor shall notify the Owner's Representative at least twenty-four (24) hours in advance of resuming operations.

6.18.3. Conformity with Plans and Specifications.

6.18.3.1. All work performed and materials furnished shall be in reasonably close conformity with the Plans and other Contract Documents requirements.

6.18.3.2. Plan dimensions and Contract Specification values are to be considered the target values to be strived for and complied with as the design values to which any allowed tolerances are applied.

6.18.3.2.1. Materials and workmanship shall be uniform in character and shall be reasonably close to the prescribed target value or to the middle portion of the tolerance range.

6.18.3.3. When the Specifications include an acceptance plan for any construction or characteristic of materials, the acceptance plan will be used by the parties to determine the attainment of Reasonably Close Conformity with plans and specifications and to assign a value to the non-conforming work which does not meet that standard.

6.18.4 Cooperation with Utilities.

6.18.4.1. The Owner will notify all utility companies, all pipe line owners, or other parties affected, and endeavor to have all necessary adjustments of the public or private utility fixtures, pipe lines, and other

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appurtenances within or adjacent to the limits of construction, which are not to be performed by the Contractor, made in accordance with the Project construction schedule.

6.18.4.2. Water lines, gas lines, wire lines, service connections, water and gas meter boxes, water and gas valve boxes, light standards, cableways, signals, and all other utility appurtenances within the limits of the proposed construction which are to be relocated or adjusted, are to be moved by their respective owners except for those to be moved by the Contractor as specifically provided in the Contract Documents.

6.18.4.3. It is understood and agreed that the Contractor has considered in his proposal all of the permanent and temporary utility appurtenances in their present or relocated positions as if same are shown on the plans and that no additional compensation will be considered for any delays, inconvenience, or damages sustained by Contractor due to any interference from the said known utility appurtenances or the operations of moving them, except in the case of failure by a utility to reasonably comply with its responsibility in relocating or adjusting its facility as required.

6.18.4.4. Prior to commencing Work, the Contractor shall make arrangements to protect the properties of all public and private utilities and other property within and adjacent to the Work area, if indicated in the Contract Documents, from damage by his construction operations.

6.18.4.5. Contractor shall cooperate with the utility owners in the removal and rearrangement of any underground or overhead utility lines or facilities to minimize interruption to service and duplication of work by the utility owners.

6.18.4.6. In the event of interruption to water or other utility services as a result of accidental breakage, or as a result of being exposed or unsupported, the Contractor shall promptly notify the proper authorities and shall cooperate with them in the restoration of service as promptly as possible.

6.18.4.7. Fire hydrants shall be kept accessible to the Fire Department at all times and no Work shall be undertaken near fire hydrants until provisions for continued service have been made.

6.18.4.8. Contractor shall be responsible for the repair costs of any damage to utility facilities caused by his equipment or operations, except for underground facilities whose existence or approximate location was previously unknown.

6.18.5. Materials.

6.18.5.1. Source of Supply and Quality Requirements.

6.18.5.1.1. The materials used in the Work shall meet all quality requirements of the Contract Documents.

6.18.5.1.2. Unless otherwise provided in the Contract Documents, all materials used in the Work shall be furnished by the Contractor from sources selected by the Contractor.

6.18.5.1.3. Materials will be tested and approved when delivered to the Project or in their final position after incorporation to the Work as provided by the individual specifications.

6.18.5.1.4. At the option of the Owner's Representative, sources of materials may be given preliminary approval before delivery is started.

6.18.5.2. Procurement and Delivery of Materials.

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6.18.5.2.1. The Contractor shall schedule the delivery at the Site of all materials and equipment required for the execution and completion of the Work at a time convenient to him so as to avoid delays in the prosecution of the Work and to allow completion of the Work within the Contract Time specified in the Contract Documents.

6.18.5.3. Earthwork Material Sources.

6.18.5.3.1. Designated Sources.

6.18.5.3.1.1. Specific sources of materials from offsite or onsite locations may be designated on the Plans and described in the Contract Documents.

6.18.5.3.1.2. Unless otherwise provided in the Contract Documents, direct payment will be made for development, preparation, erosion control, hauling and restoration of material sources or related work areas and sites.

6.18.5.3.2. Contractor Sources.

6.18.5.3.2.1. When no materials sources are designated in the Contract Documents, or if the Contractor desires to use materials from sources other than those designated, the Contractor shall be responsible for acquiring the necessary rights to take materials from the sources selected, for determining that the materials meet the specified requirements, and he shall bear all expenses for the exploration, development, erosion control and restoration of such sources, and for all costs of hauling the materials. Contractor will make sure that his sources of materials have the required permits.

6.18.5.4. Contractor's Quality Control.

6.18.5.4.1. The Contractor is responsible for the quality of all materials and workmanship furnished in the construction of the Project.

6.18.5.4.1.1. If specifically required in the Supplementary General Conditions, the Contractor shall provide his own quality control system and procedures including all personnel, equipment, supplies and facilities necessary to obtain samples, perform tests, evaluate test results and adequately control his work in order to insure that all such materials and workmanship meet the Contract requirements.

6.18.5.4.2. The Contractor shall, in all instances, perform his own process control sampling, testing and inspection during all phases of the Work as often and at a rate sufficient to assure that the Work conforms to the Contract requirements.

6.18.5.4.2.1. The Contractor shall insure that all of the testing equipment to be used is properly calibrated and meets the specifications applicable to each specified test procedure.

6.18.5.4.3. The cost of complying with Contractor's quality control obligations referred to in Article 6.18.5.4 is included in the Contract Price and no additional payment will be made therefore.

6.18.5.5. Storage of Materials.

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6.18.5.5.1. Materials shall be so stored as to assure the preservation of their quality and fitness for incorporation to the Work.

6.18.5.5.1.1. Stored materials, even though approved before storage, may again be inspected at any time prior to or during their incorporation to the Work.

6.18.5.5.1.2. Stored materials shall be located so as to facilitate their prompt inspection.

6.18.5.5.2. When authorized by the Owner's Representative, portions of the Project Site may be used for storage purposes and for the placing of the Contractor's plant/facilities and equipment provided that they are located so as not to constitute a hazard to the construction of the Project or otherwise.

6.18.5.5.2.1. Any additional space required therefore must be provided by the Contractor at his expense.

6.18.5.5.3. Private property may be used for storage purpose with written permission of the Owner or lessee, and, if requested by the Owner's Representative, copies of such written permission shall be furnished to him.

6.18.5.5.4. All temporary storage areas and plant sites shall be restored to their original condition by the Contractor, at his expense, in a manner acceptable to the Owner's Representative.

6.18.5.6. Handling of Materials.

6.18.5.6.1. All materials shall be handled in such manner as to preserve their quality and fitness for incorporation to the Work.

6.18.5.7. Materials Furnished by the Owner.

6.18.5.7.1. The Contractor shall furnish all materials required to complete the Work, except those indicated in the Contract Documents to be furnished by the Owner.

6.18.5.7.2. Except as provided in Article 6.18.5.7.4, if the material to be furnished by the Owner is to be delivered to the jobsite, the Owner, unless specified otherwise in the Contract Documents, will furnish the material to the Contractor at no cost to the Contractor and the Owner will pay for all transportation, insurance, taxes and other cost related to the furnishing of the material to the jobsite. Cost of unloading is included in the Contract Price and Contractor shall receive no additional compensation for unloading.

6.18.5.7.3. If the material to be furnished by the Owner is to be delivered to the jobsite, the Contract Documents will indicate the delivery schedule. If no such schedule is indicated, the delivery will be made as agreed by the parties. Owner shall program the delivery schedule as not to adversely affect the critical path.

6.18.5.7.4. If the material to be furnished by the Owner is not to be delivered to the jobsite the Contract Documents will indicate the terms and conditions of said delivery. If no terms and conditions are included in the Contract Documents then the cost of delivery to the jobsite is not included in the Contract Price.

6.18.5.7.5. If the material to be furnished by the Owner is not to be delivered to the jobsite the Contract Documents will indicate the date and time of availability of the material. If no such date and time is indicated, the material will be available by agreement as not to impact the critical path.

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6.18.5.7.6. The material to be furnished by the Owner will include all ancillary items included in the Technical Specification that describes the material to be furnished by the Owner, unless indicated otherwise in the Contract Documents.

6.18.5.7.7. The Owner warrants that the materials furnished by the Owner to the Contractor are of a quality sufficient for the purpose of their use. The Owner further warrants that the material to be furnished is Equal or Similar to that specified in the Technical Specification that describes the material to be furnished by the Owner.

6.18.5.7.8. The material furnished by the Owner will be of sufficient quantity including normal construction breakage, waste and shrinkage to complete the Work, unless the Contract Documents indicate otherwise.

6.18.5.7.9. The Contractor will be responsible for all Owner furnished materials delivered or made available to him in accordance with the terms and conditions of this section. If due to the fault of the Contractor, the Owner has to supply more material to the Contractor than indicated in the Contract Documents, the Owner may deduct this cost from any Partial Payment or Retainage due to the Contractor.

6.18.5.7.10. If the Owner's Representative has informed in a timely manner, the date or schedule of delivery of the material, the Contractor will be liable for all demurrage charges if he fails to receive the Owner furnished material within the time limit or schedule specified.

+ 6.18.5.7.11. Unless otherwise indicated in the Contract Documents, all costs at jobsite including unloading, handling, warehousing and Installation of the Owner furnished material are included in the Contract Price and Contractor shall not receive additional compensation therefore.

6.18.5.8. Certification of Compliance.

6.18.5.8.1. When a certification of a material or assembly is required by the Contract, each lot of such materials or assemblies delivered to the Site shall be accompanied by certificate of compliance in which the delivered material or assembly is clearly identified.

6.18.5.8.2. Commercially manufactured products shall be accompanied by certificates signed by the manufacturer and, when required, supported by tests performed by the manufacturer. Certified copies of such test results shall be furnished to the Owner's Representative.

6.18.5.8.3. Materials or assemblies accompanied by certificates of compliance may be sampled and tested at any time and if found not to be in conformity with Contract Documents will be subject to rejection at any time whether incorporated to the Work or not.

6.18.5.8.3.1. Removal of such rejected materials will be at the Contractor's expense, unless such materials have been supplied by the Owner and it was Owner's duty to test for conformity with the Contract Documents.

6.18.6 Contractor shall carry on the Work and adhere as reasonably as possible to the Progress Schedule during all Disputes or disagreements with Owner.

6.18.6.1. If the Dispute or disagreement hinders the ability of the Contractor to carry on the Work, the Contractor shall so inform the Owner.

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6.18.6.2. If the Dispute allows more than one course of action to be followed in the prosecution of the Work, the Owner's Representative may instruct the Contractor on the course of action to be followed.

6.18.6.3. No Work shall be delayed or postponed pending resolution of any Disputes or disagreements, except as permitted in section 15.4 or as Owner's Representative and Contractor may otherwise agree in writing.

6.18.7. Limitations on Operations.

6.18.7.1. Unless otherwise specified in the Contract Documents, the Contractor shall not open up new Work to the prejudice or detriment of Work already started.

6.18.7.1.1. In lineal projects, the Owner's Representative may require the Contractor to finish a section on which Work is in progress before Work is started on any additional section, if the opening of such section is essential to public safety or convenience.

6.18.7.1.2. If said order causes the Project to be delayed, the Contract Price and/or Contract Time shall be equitable adjusted.

6.19 Contractor's General Warranty and Guarantee

6.19.1. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be deficient. Contractor's warranty and guarantee hereunder excludes defects or damage after substantial, or partial completion and occupancy caused by:

6.19.1.1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or

6.19.1.2. normal wear and tear under normal usage by Owner or individuals or entities for whom Owner is responsible.

6.19.2. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:

6.19.2.1. observations by Architect/Engineer and/or Owner's Representative;

6.19.2.2. recommendation by Owner's Representative or payment by Owner of any progress or final payment;

6.19.3. the issuance of a certificate of Substantial Completion by Owner's Representative or any payment related thereto by Owner;

6.19.4. use or occupancy of the Work or any part thereof by Owner;

6.19.3. The Contractor warrants to the Owner that all materials and equipment furnished under this Contract will be new unless otherwise specified, and that all Work will be free from faults and defects and in conformance with the Contract Documents for the time periods specified in the Contract Documents or for one (1) year, whichever is

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longer, unless otherwise specified in the Contract Documents.

6.19.3.1. If required by the Owner's Representative, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

6.20 Indemnification

6.20.1. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner, Architect/Engineer, Architect/Engineer's Consultants, and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out or relating to the performance of the Work, provided that any such claim, cost, loss, or damage:

6.20.1.1. is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting there from; and

6.20.1.2. only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.

6.20.2. The indemnification obligations of Contractor under section 6.20.1 shall not extend to the Architect/Engineer and Architect/Engineer's Consultants or to their officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them arising out of:

6.20.2.1. errors and/or omissions in the preparation or approval of, or the failure to prepare or approve, maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

6.20.2.2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 Subcontractors, Suppliers and Others

6.21.1. Award of Subcontracts for Portions of The Work.

6.21.1.1. Unless otherwise specified in the Contract Documents the Contractor, as soon as practicable after the signing of the Contract, shall furnish to the Owner's Representative in writing for his acceptance a list of the names of the main Suppliers and Subcontractors proposed for the principal portions of the Work.

6.21.1.1.1. The Owner's Representative shall promptly notify the Contractor in writing if he, after due investigation, has reasonable objection to any Supplier or Subcontractor on such list and does not accept him. Said reasonable objection may include, but are not limited to, previous default by said Subcontractor or Supplier with Owner, a record of flagrant safety violations or an unsatisfactory past performance with Owner.

6.21.1.1.1.1. The Owner's Representative shall specify in writing the reasons for such objection

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6.21.1.1.1.2. If within fifteen (15) calendar days from submittal by the Contractor, the Owner's Representative fails to make objections to any Supplier or Subcontractor on the list, the Contractor shall request the approval of the list by the Owner's Representative who shall have ten (10) days to issue his decision. If no reply is forthcoming from the Owner's Representative within the stated time, the list of Suppliers or Subcontractors shall be deemed approved.

6.21.1.1.2. The Contractor shall not contract with any Supplier or Subcontractor or any person or organization (including those who are to furnish materials or equipment fabricated to a special design) that has been rejected by the Owner's Representative in the manner indicated in Article 6.21.1.1.1, above.

6.21.1.1.3. If the Owner's Representative refuses to accept any Supplier, Subcontractor, person, or organization on a list submitted by the Contractor in response to the requirements of the Contract Documents, the Contractor shall submit an acceptable substitute.

6.21.1.1.3.1. No increase in the Contract Sum shall be allowed for any such substitution of a rejected Subcontractor and/or Supplier or other in accordance with Article 6.21.

6.21.1.1.3.2. No acceptance by Owner's Representative of any such Subcontractor, Supplier, or other individual or entity, whether initially, or as a replacement, shall constitute a waiver of any right of Owner's Representative or Engineer to reject defective Work.

6.21.1.1.4. Unless otherwise specified in the Contract Documents, the Contractor shall execute, with his own forces and organization, Work amounting to not less than twenty-five percent (25%) of the original total Contract Price.

6.21.1.1.4.1. Any items designated in the Contract Documents as "Specialty Trades or Items" shall be deducted from original total cost before computing the amount of the work required to be performed by the Contractor with his own forces and organization

6.21.2. Payments to Subcontractors.

6.21.2.1. The Contractor shall pay each Subcontractor for work performed in the Project in accordance with the terms and conditions stipulated in the contract executed by and between the Contractor and the Subcontractor.

6.21.2.1.1. The Contractor shall also require the Subcontractor to make similar payments to his Sub-Subcontractors.

6.21.3. Flow Down of Applicable Agreement Provisions.

6.21.3.1. The Contractor shall cause the inclusion, in all agreements executed by contractor with Subcontractors and Suppliers, of all applicable provisions of the Agreement with which Subcontractors and Suppliers need to comply for their proper performance on behalf of Contractor, of the duties and obligations imposed by the Contract Documents. Contractor shall also cause Subcontractor and Suppliers to include in their respective agreements with Sub-Subcontractors, and Sub-Suppliers the same duties to flow down to all lower tier agreements such applicable Agreement provisions.

6.21.4. The Contractor shall be considered as an independent contractor for all purposes under the Contract, and no persons engaged or contracted by the Contractor for the performance of Contractor's obligations shall be considered an employees or agents of the Owner.

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6.21.5. Contractor shall be fully responsible to Owner's Representative, Owner and Architect/Engineer for all acts and omissions of the Subcontractors, Suppliers, and other such individuals or entities performing or furnishing any of the Work.

6.21.5.1. Nothing in the Contract Documents shall create for the benefit of any Subcontractor or Supplier a contractual relationship between Owner's Representative, Owner or Architect/Engineer, nor shall it create any obligation on the part of Owner's Representative, Owner or Architect/Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws or Regulations.

6.21.6. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other such individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.

6.21.7. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Owner's Representative only through Contractor.

6.21.8. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner's Representative, Owner and Architect/Engineer, including required contract provisions applicable to Federal Agency funded projects.

6.21.8.1. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in section 3.6, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights (including subrogation) against Owner, Contractor, Architect/Engineer, Architect/Engineer's Consultants, and all other individuals or entities identified in the Contract Documents to be listed as insured or additional insured (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to Work.

6.21.8.1.1. If the insurers underwriting any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

ARTICLE 7 - ARCHITECT/ENGINEER AND DESIGNATED INSPECTOR

7.1 Administration of the Contract

7.1.1. The Owner will provide general Administration of the Construction Contract, including performance of the functions hereinafter described, through the Owner's Representative.

7.1.2. The Owner, prior to the start of the Project, will inform the Contractor in writing the name of the Owner's Representative. If the Owner's Representative is changed during the course of the project the Owner will inform the Contractor in writing the name of the new Owner's Representative. If the Contractor has valid reasons for objecting said designation, Contractor shall so inform the Owner in writing and, if Owner deems Contractor's reasons valid, a different Owner's representative shall be chosen by the Owner.

7.1.3. The Owner may from time to time change the person or entity designated as Owner's Representative, or may

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assume and/or change the functions of the Owner's Representative, and the Architect/Engineer by notifying the Contractor in writing.

7.2 Duties of Architect/Engineer and the Owner's Representative

7.2.1. The Architect/Engineer is the person or entity who prepares the Drawings and Specifications for the Owner and is responsible for the analysis, design, and code compliance of the Project.

7.2.1.1. The Architect/Engineer will make periodic visits to the site to familiarize himself generally with the progress and quality of the Work and to determine in general if the Work is proceeding in accordance with the Contract Documents.

7.2.1.1.1. Based on on-Site observations, the Architect/Engineer will keep the Owner informed of the progress of the Work, and will endeavor to safeguard the Owner against defects and deficiencies in the Work.

7.2.1.1.2. The Architect/Engineer will be the Owner's representative for technical matters related to the Contract.

7.2.1.1.3. The Architect/Engineer will be the primary interpreter of the plans and specifications.

7.2.1.1.4. The Architect/Engineer and Owner's Representative will not be responsible for the acts or omissions of the Contractor, or any Subcontractor and vice-versa, or any of their agents or employees, or any other persons performing any of the Work.

7.2.2. The Owner's Representative will represent the Owner in the interpretation of all contractual and non-technical matters. The Owner's Representative will have authority to act on behalf of the Owner to the extent provided in the Contract Documents.

7.2.2.1. All communications related to this Contract between the Contractor and Architect/Engineer shall be made thru the Owner's Representative, except that any party may directly communicate orally or by written communication with the others if authorized by the Owner's Representative, or in case of an Emergency.

7.2.2.2. The Owner's Representative may delegate some or all of his functions to Project Inspectors and/or Inspectors.

7.2.2.2.1. The Owner's Representative will inform the Contractor the name of the Project Inspectors and/or Inspectors. If the Contractor has a valid reason for not accepting the designated Project Inspector, he shall so inform the Owner in writing and if Owner deems the reason valid a different Owner's representative shall be chosen by the Owner.

7.2.2.2.2. Inspectors employed by the Owner, the Architect/Engineer and/or the Owner's Representative are authorized to inspect all work done and materials furnished, including the preparation, fabrication or manufacture of the materials to be used.

7.2.2.2.3. Inspectors also have the authority to reject any materials and work until any questions at issue can be resolved.

7.2.2.3. Owner's Representative and/or inspectors are not authorized to alter or waive the provisions of the

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Contract, to issue instructions contrary to the plans and specifications, or to act as foremen for the Contractor.

7.2.2.4. Based on his observations and the Contractor's Application for Payment, the Owner's Representative will determine the amount owed to the Contractor and will recommend approval of Payment in such amount.

7.2.2.4.1. If the Owner so requires, Architect/Engineer will also review, and approve, the Contractor's Application for Payment.

7.2.2.5. The Owner's Representative will prepare Change Orders, and Extra Work Orders, in accordance with these General Conditions.

7.2.3. The Owner's Representative, the Architect/Engineer and/or the Owner shall at all times have access to the Work either in preparation or in progress. The Contractor shall provide access to the Work so that at all times Owner's Representative may perform his duties under the Contract Documents, and Contractor shall provide such information and assistance, as is required, to make a complete and detailed inspections.

7.2.3.1. If the Owner's Representative, and/or the Owner, request it, the Contractor, at any time before Final Acceptance of the Work, shall remove or uncover such portions of the finished Work as instructed. After examination, the Contractor shall restore said portions of the Work to the standard required by the specifications.

7.2.3.1.1. Should the Work so exposed and examined prove acceptable, the uncovering, or removing, and the replacing of the covering will be paid by the Owner as extra work; but should the Work so exposed or examined prove unacceptable, the uncovering, removing, remediation and the replacing of the covering will be at the Contractor's expense.

7.2.3.1.2. Any Work done or materials used without supervision or inspection by an authorized Owner's representative may be ordered removed and replaced at the Contractor's expense unless the Owner representative failed to inspect after having been given a written notice of at least two (2) Working Days prior to the date in which Work was performed.

7.2.3.1.3. When any government agency or any utility is to accept or pay for any portion of the Work, its respective representatives shall have the right to inspect the Work. Such inspection shall not make the government agency or utility a party to the Contract. Contractor and Owner shall diligently perform all necessary actions to promote the timely inspection of the Work in a manner that does not affect the critical path.

7.2.3.1.4. The inspection of the Work and materials by the Owner shall not release the Contractor of any of his obligations under the Contract as prescribed in the plans, specifications and other Contract Documents.

7.2.3.1.5. The Owner's Representative will conduct inspections to determine the dates of Substantial Completion and final completion and will receive and review written guarantees and related documents submitted by the Contractor.

7.2.3.1.6. In case of any dispute between the Contractor and any one Project Inspector or Inspector as to materials furnished or the manner of performing the Work, the Project Inspector or the Inspector shall have the authority to reject materials or suspend the work until the question at issue can be referred to and decided by the Owner's Representative, within reasonable promptness, so as not to alter the critical path or modify substantially the float and the programmed progress of the job.

7.2.4. The Owner's Representative will be, in the first instance, the interpreter of the requirements of the Contract

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Documents, except as indicated in Article 7.2.1.3. The Owner's Representative will, within a reasonable time, render such interpretations that he, or the Contractor, if so requested, may deem necessary for the proper execution or progress of the Work.

7.2.4.1. All interpretations and decisions of the Owner's Representative shall be consistent with the intent of the Contract Documents. In his capacity as interpreter, he will exercise his best efforts to insure faithful performance under the Contract.

7.2.4.2. Claims, disputes and other matters in question relating to the execution or progress of the Work or the interpretations of the Contract Documents shall be submitted initially to the Owner's Representative for a decision in accordance with Article 11.

7.2.5. The Owner's Representative will have authority to reject work only when such work does not conform to the Contract Documents. Whenever, in his reasonable opinion, he considers it necessary or advisable, to insure the proper implementation of the intent of the Contract Documents, he will have authority to require special inspection or testing of the Work in accordance with Article 12.3 whether or not such Work is then fabricated, installed or completed.

7.2.5.1. However, neither the Owner's Representative's authority to act under this Article, nor any decision made by him in good faith either to exercise or not to exercise such authority, shall give rise to any duty or responsibility of the Owner, Owner's Representative or Architect/Engineer to the Contractor, any Subcontractor, any of their agents or employees, or any other person performing any of the Work, nor will the Contractor be released from any of his obligations under the Contract.

7.2.5.1.1. The Owner's Representative shall have the authority to stop the Work in whole or in part when such stoppage is necessary to insure the proper execution of the Work and compliance by contractor with the Contract.

ARTICLE 8 - OTHER WORK AND SEPARATE CONTRACTS

8.1 Owner's Right to Award Separate Contract, Perform Work with Owner's Employees and Utility Workers. Related Work at Site

8.1.1. Owner's Right to Award Separate Contract, Perform Work with Owner's Employees and Utility Workers.- Owner may perform other work related to the Project at the Site with Owner's employees, or by awarding separate contracts, or by having the work performed by utility workers. Written notice thereof will be given to Contractor prior to starting any such other work.

8.1.1.1. If the terms and conditions of the work to be performed by Owner's employees, separate contractors or by others, are not described in the Contract Documents prior to the bid, the Contract Time and Sum will be equitably adjusted as a result of said work and any other work to the extent that such work performed by Owner's employees, separate contractors or by others affects the Contractor's Work.

8.1.1.2. If the terms and conditions of the work to be performed by Owner's employees, separate contractors or by others are described in the Contract Documents prior to the bid, then the Contract Time and Sum will be equitably adjusted but only to the extent that said work differs from the work indicated in the Contract Documents that is to be performed by Owner's employees, separate contractors or by others.

8.1.1.3. Should the performance of other work related to the Project at the Site by Owner's employees,

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separate contractors, utility workers, that was not indicated in the Contract Documents, cause damages, delays or interferes with the Work being performed by the Contractor, the Owner will assume full responsibility and pay for all costs, expenses, and delays to which the Contractor is subjected caused by the execution and/or performance of said other work described herein if the critical path is adversely affected.

8.1.1.4. In the event one or more contracts are awarded related to the Project, the "contractor" in the contract document in each case, will be the contractor who signs each separate contract.

8.1.1.5. If there is under construction other work for Owner, by written contract or otherwise, adjacent to the limits of the site, the Contractor, if so ordered by the Owner, shall permit access to others performing such work through the Site.

8.1.1.5.1. If Owner authorizes the other contractors performing work adjacent to the Site to use said access Owner shall prescribe limitations and conditions for such use as required to protect Contractor's operations and the Work.

8.1.1.5.1.1. In accordance with this Article 8.1, the Owner will be responsible for any damages, costs, or delays caused to the Contractor by such order.

8.1.1.6. If Owner and Contractor are unable to agree on entitlement to or on the amount or time, if any, of any adjustment in the Contract Price or Contract Time necessary as a result of such other work, a Claim may be made therefore as provided in Article 11.5.

8.1.2. Coordination of the Separate Contracts and Work by Others.

8.1.2.1. Unless otherwise specified in accordance with Article 8.1.2.4, Owner shall be responsible for the coordination of the Work between the Contractor, Owner's employees, the separate contractors and any others, as to the interaction and scheduling of the various work and the proper and safe access to the Site and storage of the equipment and materials of the Contractor, the Owner's employees, the separate contractors and others contracted by Owner.

8.1.2.2. Contractor shall fully cooperate with the Owner in the coordination of the Contractor's Work with that of the Owner's employees, the separate contractors and any work by others as to the interaction and scheduling of the various work and the proper and safe access to the Site and storage of the equipment and materials of the Contractor, the separate contractors and others.

8.1.2.3. The Owner may delegate this coordination, in whole or in part, to a Construction Manager or separate contractor and must give prior notice to Contractor in writing, containing the terms and conditions of this delegation.

8.1.2.3.1. The Construction Manager or the separate contractor will act on behalf of Owner strictly within the limits of such delegation.

8.1.2.4. The Owner may delegate this coordination responsibility in whole or in part to one of the separate contractors or to the Contractor as follows:

8.1.2.4.1. If prior to the bid opening date, the Owner requires that the Contractor be responsible for the coordination of the Owner's employees, separate contracts or any work by others, the Owner will indicate the

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terms and conditions of such obligation in the bid documents and it shall be the Contractor's responsibility to include in the Contract Price whatever costs are required for this coordination of the work.

8.1.2.4.2. If the Owner requires that Contractor be responsible for the coordination of Owner's employees, separate contracts or work by others after the bid has been awarded, the Owner will indicate the terms and conditions of such obligation as a Change Order.

8.1.2.5. Contractor Coordination Meetings:

8.1.2.5.1. If the Owner, or the party with the coordinating responsibility so requires it, the Contractor shall attend coordination meetings with the Owner's employees, separate contractors or others performing work at a site to be determined by the coordinator.

8.1.2.5.1.1. The purpose of the coordination meeting shall be for the Contractor and all separate contractors and/or others performing work to coordinate schedules and construction activities to enable the construction of the different work under the separate contracts to occur on a coordinated, efficient and expeditious manner.

8.1.2.5.1.2. The coordination meeting shall also serve as forum for the Contractor and all separate contractors and/or others performing work at the site to discuss, and try to avoid and try to resolve between and among themselves any conflicts in their respective schedules or construction activities and prevent delays in one contractor's activities caused by another.

8.1.2.5.2. If the different contractors cannot reach an agreement on the coordination of the construction activities and schedule to be followed, the Owner, or his designated coordinating representative, will decide on the course of action to be followed and shall provide the necessary instructions to the Contractor, Owner's employees, separate contractors and others performing work on how to proceed, as a Field Order or, if required, as a Change Order.

8.1.3. Contractor, and any other entity contracted by the Owner to perform direct work related to the Project, shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate such other work with the work of the Contractor or any other entity contracted by the Owner to perform related work on the Project.

8.1.3.1. Contractor, or any other entity contracted by the Owner to perform related work on the Project, shall not endanger any work of others by cutting, excavating, or otherwise altering their work and will only cut or alter their work with the written consent of Owner and the others whose work will be affected.

8.1.4. The duties and responsibilities of Contractor under this Article are for the benefit of such utility owners and separate contractors to the extent that there are comparable provisions for the benefit of Contractor, including general, supplemental and special conditions, as well as similar insurance and hold harmless clauses, in said direct contracts between Owner and such utility owners and separate contractors.

8.1.4.1. Furthermore, the Owner will verify that the schedule of others contracted to perform related work on the Project does not interfere with the Project Schedule.

8.1.4.1.1. If in order to accommodate the work performed by others contracted by the Owner to perform related work in the Project, the critical path is adversely affected and/or any damage to the Work occurs, the Owner will compensate the Contractor in time and/or adjustment to Contract Price.

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8.1.5. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article, Contractor shall promptly inspect such other work and, within ten (10) working days, report to Owner in writing any delays, defects, or deficiencies in such other work that, in his opinion, render it unavailable or unsuitable for the proper execution and results of the Work.

8.1.5.1. Contractor's failure to report will constitute acknowledgement that said work is suitable, except for hidden latent defects in such work.

8.1.5.2. The same rules stated herein will apply if other entities contracted by the Owner to perform related work in the Project depend on Work performed by the Contractor.

8.2 Owner's Right to Award Separate Contract.

8.2.1. The Owner may award separate contracts in connection with other portions of the Project or additional work to the Work covered by the Contract, and if such work affects the Work, Contractor will be notified by Owner in a timely manner of the award of such separate contract.

8.2.1.1. The Owner may assign these separate contracts, as a Change Order, to the Contractor for a fee, as indicated on Article 10.5.

8.2.2. When Separate Contracts are let within the limits of any project, the Owner shall coordinate the work of each contractor so as not to interfere with or hinder the progress or completion of the Work being performed by Separate Contractors.

8.2.2.1. Contractors working on the same Project shall fully cooperate with each other.

8.2.2.2. Furthermore, the Owner will be responsible to verify that the schedule of the Separate Contractors contracted to perform Work on the Project does not interfere with the Contractor's Project Programmed Schedule previously approved for the Project.

8.2.2.2.1. Owner will compensate the Contractor, in time and/or adjustment to Contract Price, if his schedule has to be varied, and/or any damage occurs, to accommodate the work performed by other entities contracted by the Owner to perform related work in the Site.

8.3 Mutual Responsibility of Contractors

8.3.1. Each Contractor involved shall assume all liability, financial or otherwise, in connection with his Contract and shall protect and save harmless the Owner from any and all damages or claims that may arise out of the performance of the Contractor's Work.

8.3.1.1. The Owner will require from each Separate Contractor and other entities working on the Project, Contract Documents, including General, Supplemental and Special Conditions, similar to those executed with the Contractor and to include similar insurance clauses and hold harmless clauses.

8.3.1.2. The Owner will also be responsible to verify that the schedule of the Separate Contractors) and other entities working on the project do not interfere with the Contractor's Project Programmed Schedule previously approved for the Project.

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8.3.2. Should the Contractor cause damage to the work or property of any separate contractor and/or others working on the Project, the Contractor shall, be liable for said damage.

8.3.2.1. If such other separate contractor files a claim against Owner on account of any such damage alleged to have been so sustained, Contractor shall have the right to defend Owner, either by itself or in conjunction with Owner, and Contractor shall compensate Owner for damages, costs and expenses sustained therefore by Owner which are attributable to Contractor.

8.3.2.1.1. If the Contractor is found to be responsible for the alleged defects claimed by the separate contractor and any judgment or award against the Owner arises therefrom, the Contractor shall pay or satisfy it and shall reimburse the Owner for all attorney's fees and court, arbitration costs or other costs which the Owner has therefore incurred.

8.3.2.1.2. If the Contractor is found not to be responsible for the alleged defects claimed by the separate contractor, then the Owner shall pay for any judgment or award against him as well as reimburse the Contractor for all attorney's fees and court or arbitration costs incurred in defending the Owner.

ARTICLE 9-TIME

9.1 Progress and Completion

9.1.1 All time limits stated in the Contract Documents are of the essence of the Contract.

9.1.2 The time limit for the execution of this Contract has been figured out based on the Architect/Engineer and/or Owner's estimate.

9.1.2.1. Such time limit to into consideration all Sundays, legal holidays indicated in Article 1.1.1.4,1, included within the said time limit.

9.1.2.2. The Contractor will be entitled to work premium time (overtime) as required to comply with the schedule of the Project.

9.1.2.2.1. No work shall be performed on Saturdays, Sundays or legal holidays, except in cases of emergency, or unless prior written permission has been granted by the Owner's Representative.

9.1.2.2.1.1. Except in cases of emergency, request for permission to Work on Saturdays, Sundays or legal holidays shall be filed with the Owner's Representative not less than twenty four (24) hours in advance of said date, if the activity affects the critical path and not less than forty eight (48) hours if the proposed activity does not affect the critical path.

9.1.2.2.1.2. Said permission shall not be unreasonably denied.

9.1.2.2.2. Premium time (overtime) necessary in case of emergency, or for completion of daily work, or to comply with the Project schedule, shall be notified to the Project Inspector during the course of the day that said premium time will be worked.

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9.1.3. The date of commencement of the Work shall be stated in the Notice to Proceed.

9.1.3.1. The Contractor shall begin the Work on such date of commencement fixed by the Notice to Proceed.

9.1.3.2. The Contractor shall carry out the Work expeditiously with adequate forces and shall complete it within the Contract Time

9.1.3.3. A Notice to Proceed issued without the Owner having furnished all required permits and/or endorsements necessary to commence the Work which fixes a commencement date which cannot be complied with due to the lack of such permits shall constitute a valid basis for a claim by Contractor under Article 11.5 if such act adversely affects the Project's critical path and no concurrent cause of delay by the Contractor is present.

9.1.4. The Contract Time limit to execute the Work until it is substantially complete shall be that number of calendar days resulting from the sum of the original Contract Time and the authorized extensions to the original Contract Time. Said Contract Time shall start to run on the date fixed in the Notice to Proceed (the commencement date) and shall end on the date of Substantial Completion. If the work is Substantially Completed prior to said time limit, the Contractor will have achieved early completion, if Work is not Substantially Completed within said time limit, the Contractor will not have completed the Work on time in accordance with the Contract.

9.1.4.1. Time under the Contract will, stop running on the date of Substantial Completion.

9.2 Change of Contract Time

9.2.1. The Contract Time (or Milestones) may only be changed with a Change Order, Extra Work Order or by a Written Amendment.

9.2.1.1. Any Claim for an adjustment in the Contract Time (or Milestones) shall be based on a written notice submitted by the party making the claim to the Owner in accordance with the provisions of Article 11.5.

9.2.2. Any adjustment of the Contract Time (or Milestones) due to any delay beyond the control of Contractor, will be made in an amount equal to the time lost due to such delay, including its consequences, if a Claim is made therefore as provided in Article 11.5 only if such delay affect the critical path, as reflected in the monthly Progress Schedule.

9.2.2.1. Delays beyond the control of Contractor shall include, but are not limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated on these General Conditions, lack of, or lapse, of any permit, or endorsement, issued by the governmental entities having jurisdiction in the Project which are the responsibility of Owner, fires, floods, epidemics, weather conditions, or acts of God.

9.3 Delays and Extensions of Time

9.3.1. No extension of the Contract Time will be allowed for any reason except as provided below:

9.3.1.1. If satisfactory fulfillment of the Contract with authorized extension and increases requires the performance of Work in greater quantities than those set forth in the proposal so that the total final payment is

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greater than the total original Contract Price, then the time allowance will be equitably adjusted taking into account the amount and difficulty of the additional Work and only if the scope of the Work is increased or the critical path of the Project Schedule is affected.

9.3.1.2. In case of total suspension ordered by the Owner and not due to any fault of the Contractor, the total number of calendar days during which the Work is suspended shall be added to the Contract Time. In case of suspension of part of the Work ordered by the Owner not due to any fault of the Contractor, the Contract Time shall be extended to the extent that the effect that such suspension has on the Contract Time, and only to the extent the critical path of the Project Schedule is affected.

9.3.1.2.1. After Contractor has taken all reasonable steps to minimize Project overhead during the suspension, the Project fixed overhead costs incurred during the suspension by the Contractor will be reimbursed to Contractor by the Owner.

9.3.1.3. In case of damage to the Work due to Force Majeure, the Owner shall equitably adjust Contract Time based on the time required to repair the damage, provided the critical path is affected.

9.3.1.4. In case of delays or interruptions to the Work caused by any act of the Owner, or by any separate Contractor employed by the Owner or by any other cause not attributable to the fault or negligence of the Contractor, then the Contract Time shall be equitably adjusted.

9.3.1.4.1. The Project reasonable fixed overhead costs incurred by the Contractor due to the time extension caused by the acts described in Article 9.3.1.4, will be reimbursed to the Contractor by the Owner.

9.3.1.5. Every Change Order, Extra Work Order or Supplemental Agreement, if any, shall include all adjustments to Contract Time and to Contract Price related thereto, if any.

9.3.1.6. Unless otherwise specified in the Contract Documents, additional Contract Time will be allowed due to weather conditions, and their consequences, which render the performance of Work impossible.

9.3.1.7. Except as otherwise stated in this Article 9, where Contractor is prevented from completing any part of the Work within the Contract Time (or Milestones) due to delays beyond the control of both Owner and Contractor, if the critical path of the Project Schedule is affected, an extension of the Contract Time (or Milestones) for a period of time equal to the time lost due to such delay shall be Contractor's sole and exclusive remedy for such delay.

9.3.2. Extension in Contract Time shall not be considered or allowed for the following reasons:

9.3.2.1. Suspensions of Work ordered by the Owner or Owner's Representative due to the fault of the Contractor or his Subcontractor.

9.3.2.2. Unauthorized suspensions of Work by the Contractor.

9.3.2.3. Delays within the control of Contractor.

9.3.2.3.1. Delays attributable to or within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

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9.3.3 All notifications of claims for extension of time shall be made in writing by the Contractor to the Owner's Representative not more than thirty (30) working days after acquiring knowledge of the occurrence of the delay. Once made, the Contractor must supplement such claim by notice to Owner within thirty (30) working days after the event that caused the delay has concluded. If proper notification of a claim or subsequent supplemental notice is not given to Owner, then all related claims regarding increases to Contract Time, and Contract Price will be deemed waived by Contractor.

9.3.3.1. Claims for extension of time shall include:

9.3.3.1.1. the reasons for the time extension as required by the Owner's Representative;

9.3.3.1.2. the operation(s) alleged to have been delayed;

9.3.3.1.3. the calendar dates on which the operation(s) were delayed;

9.3.3.1.4. the number of calendar days by which Contractor requests Contract Time be extended;

9.3.3.1.5. a complete and detailed statement as to how the critical path was affected; and

9.3.3.1.6. a complete and detailed breakdown of adjustment to Contract Price to be claimed due to the claimed time extension, if adjustment to Contract Price is to be claimed.

9.4 Delay Damages

9.4.1. In no event shall Owner or Architect/Engineer be liable to Contractor, any Subcontractor, any Supplier, or any other person or organization, or to any surety for or employee or agent of any of them, for damages arising out of or resulting from:

9.4.1.1. delays caused by or within the control of Contractor; or

9.4.1.2. delays caused by Force Majeure and/or beyond the control of both Owner and Contractor .

9.4.1.3. delays not notified within the time specified in Article 9.3.3 or contrary to Article 9.3.3.1.

9.4.2. Nothing in this Article 9 bars a change in Contract Price to compensate Contractor due to delay, interference, or disruption directly attributable to actions or inactions of Owner or anyone for whom Owner is responsible, provided Contractor complies with the requirements of Articles 9.3.3. and 9.3.3.1.

9.5 Liquidated Damages

9.5.1. Unless otherwise specified in the Contract Documents should the Contractor or, the Surety in case of Termination for Cause, fail to complete all the Work within the time specified in the Contract or as extended by the written authorization of the Owner, a deduction of the amount stipulated herein will be made for each and every calendar day that the Work is not completed after the expiration of the time limit to execute the Work described in Article 9.1.4:

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SCHEDULE OF LIQUIDATED DAMAGES		
Original Contract Price		
From More Than	To and Including	Daily Charge
\$ 0.00	\$ 99,999.99	\$ 300.00
\$ 100,000.00	\$ 499,999.99	\$ 400.00
\$ 500,000.00	\$ 999,999.99	\$ 800.00
\$ 1,000,000.00	\$ 1,999,999.99	\$ 1,000.00
\$ 2,000,000.00	\$ 4,999,999.99	\$ 2,000.00
\$ 5,000,000.00	\$ 9,999,999.99	\$ 3,000.00
\$ 10,000,000.00	\$19,999,999.99	\$ 4,000.00
\$ 20,000,000.00	\$29,999,999.99	\$ 5,000.00
\$ 30,000,000.00	\$39,999,999.99	\$6,000.00
\$ 40,000,000.00	\$49,999,999.99	\$7,000.00
Over \$50,000,000.00	Unlimited	\$8,000.00 or as otherwise indicated in the Special Conditions

9.5.2. This amount will be deducted from any money due or that may become due the Contractor or his Surety by Owner.

9.5.3. The Original Contract Price in the above schedule of Liquidated Damages for unit price projects refers to the total original contract amount including all the units in a multi-unit contract. Liquidated damages will be applied on multi-unit contracts based on the daily charges applicable to the total original contract amount.

9.5.4. The amount stipulated in Article 9.5.1, or otherwise if otherwise specified in the Contract Document, as the case may be, shall be considered and treated not as a penalty, but as a total, fixed, and agreed upon liquidated damages due the Owner by the Contractor or, by the Surety in case of Termination for Cause, for and including but not limited to, public inconvenience, obstruction to traffic, interference with and/or loss of business, increase of engineering, inspection and administrative cost to the Owner; and other costs and expenses which have caused an expenditure of public funds, resulting from the Contractor's, or in case of Termination for Cause of the Surety's, failure to complete the work within the time specified in the Contract.

9.5.5. Permitting the Contractor to continue and finish the Work or any part thereof after expiration of the time limit for Substantial Completion described in Article 9.1.4 shall in no way operate as a waiver of any right or remedy available to Owner under this Contract or at law.

9.6 Early Completion Incentive

9.6.1. Unless otherwise stated in the Contract Documents, should Contractor Substantially Complete the Work before expiration of the Contract Time as extended by the Owner, the Contractor shall receive an incentive pay from the Owner equal to one half (1/2) of the stipulated liquidated damages for each calendar day the Work is Substantially Completed prior to the time limit to complete the Work described in Article 9.1.4.

ARTICLE 10 - CHANGE OF CONTRACT PRICE, COST OF THE WORK AND UNIT PRICE WORK

10.1 Change of Contract Price

10.1.1. The Contract Price may only be changed by a Change Order or by a Written Amendment. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Owner in accordance with Article 11.5.

10.1.2. The value of the Work covered by a Change Order or covered by a Claim for an adjustment in the Contract Price will be determined as follows:

10.1.2.1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of section 10.4); or

10.1.2.2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with section 10.5) or by newly agreed unit prices; or

10.1.2.3. where the Work involved is either: (a) not covered by unit prices contained in the Contract Documents, or (b) agreement as to a lump sum is not reached (under Article 10.1.2.2,) the value of the work shall be computed on the basis of the Cost of the Work (determined as provided in Article 10.2) plus a Contractor's fee for overhead and profit (as provided in Article 10.5).

10.2 Cost of the Work

10.2.1. Costs Included: The term Cost of the Work means the sum of all costs necessarily incurred and paid by Contractor in the proper performance of a change in the Work. When the value of any Work covered by a Change Order, Extra Work Order or Construction Change Directive or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work. Except as otherwise agreed in writing by Owner's Representative, such costs shall be in amounts no higher than those prevailing in the locality of the Project and shall include only the items indicated below:

10.2.1.1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classification agreed upon by Owner's Representative and Contractor.

10.2.1.1.1. Such employees shall include without limitation engineers, superintendents, foremen, and other supervisory, safety, security and clerical personnel employed full time at the Site.

10.2.1.1.2. Payroll costs for employees not working exclusively in connection with the Work shall be apportioned based on their time spent working on the Work.

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10.2.1.1.3. Payroll costs shall include, but shall not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, union, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto.

10.2.1.1.4. The expenses of performing Work outside the regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above mentioned costs, to the extent authorized by Owner's Representative.

10.2.1.2. Actual cost of all necessary materials and equipment furnished and incorporated in the Work, including costs of transportation, taxes and reasonable and necessary storage thereof, and Suppliers' field services required in connection therewith.

10.2.1.2.1. All cash discounts with regard to the purchase by Contractor of materials and equipment shall accrue for the benefit of Contractor unless Owner deposits funds with Contractor with which to purchase the materials and equipment, in which case the cash discounts shall accrue to Owner.

10.2.1.2.2. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that these discounts etc. may be obtained.

10.2.1.3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors.

10.2.1.3.1. If required by Owner's Representative, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Architect/Engineer, which bids, if any, will be acceptable.

10.2.1.3.2. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Article 10.2.

10.2.1.4. Reasonable and necessary costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services exclusively related to the Work.

10.2.1.5. Supplemental costs including the following:

10.2.1.5.1. The proportion of reasonable and necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work. Airplane travel shall be on coach class and the car transportation, hotel and subsistence shall be at moderate cost.

10.2.1.5.2. Reasonable cost, including transportation, taxes and maintenance, of all materials, supplies, equipment, machinery, appliances, computers, office, warehousing and temporary facilities exclusively related to the Contract, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

10.2.1.5.3. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner's Representative with the advice of Architect/Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and

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removal thereof.

10.2.1.5.3.1. All such costs shall be in accordance with the terms of said rental agreements.

10.2.1.5.3.2. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

10.2.1.5.4. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, imposed by Laws and Regulations.

10.2.1.5.5. In such instances (only) where Contractor is insured under OCIP, or where the Owner assumes responsibility for some part of the required projects insurances (such as Builder's Risk) losses and damages (and related expenses) caused by damage to the Work, not compensated by said insurance, sustained by Contractor in connection with the performance of the Work, provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable.

10.2.1.5.5. 1. Such losses shall include settlements made with the written consent and approval of Owner's Representative. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

10.2.1.5.6. The cost of all utilities, telephone, data, fax, internet, security services, fuel, and sanitary facilities within the Site.

10.2.1.5.7. When the Cost of the Work is used to determine the value of a Change Order, or Construction Change Directive, Extra Work Order or of a Claim, the cost of premiums for additional Bonds and insurance required because of the changes in the Work.

10.2.1.5.8. An amount of the Contractor's main office overhead costs, when applicable, reached by mutual accord between the parties. If no mutual accord can be reached, the cost for main office overhead shall be computed using the Eichleay case and subsequent case law. If the Contractor does not have financial statements prepared externally by a recognized CPA, he must prepare them in order to be able to present a claim for this purpose.

10.2.2 Costs Excluded: The term Cost of the Work shall not include any of the following items:

10.2.2.1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor who work at Contractor's principal, branch or other office, other than Contractor's office at the Site, for general administration of the Work, all of which are to be considered administrative costs covered by the Contractor's fee, and not specifically included in the agreed upon schedule of job classifications referred to in Article 10.2.1.1 or specifically covered by Article 10.2.1.4.

10.2.2.2. Expenses of Contractor's principal, branch or other offices, other than Contractor's office at the Site.

10.2.2.3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed

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for the Work and charges against Contractor for delinquent payments.

10.2.2.4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, or making good any damage to property.

10.2.2.5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Articles 10.2.1.1 and 10.2.1.2, unless proven as a valid reasonable and necessary expense directly and exclusively related to the Project.

10.2.3. Contractor's Fee. When the value of any Work covered by a Change Order/Extra Work Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Article 10.5.

10.2.4. Documentation: Whenever the Cost of the Work for any purpose is to be determined pursuant to Articles 10.2.1 and 10.2.2, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Architect/Engineer, or Owner's Representative, an itemized cost breakdown together with supporting documentation and data.

10.2.5. Time Extension: Whenever additional time is required to perform extra work, said time allotment shall be included as part of the Change Order.

7 10.2.6. If the requirement specified in Article 10.1.2.3, above, causes a delay in the project completion, the costs of said delays, including project and main office overhead shall be added to the cost of the Work and a reasonable time extension provided under the Contract.

10.3 Cash Allowances

10.3.1. Unless otherwise stated in the Contract Documents, it is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents.

10.3.2. Items covered by allowances shall be supplied for such amount and by such persons or entities as the Owner's Representative may direct, but the contractor shall not be required to employ persons or entities against which the Contractor makes written reasonable objections.

10.3.3. If the allowance covers the cost of only furnishing material or , the allowance should include:

10.3.3.1. The cost to Contractor (less any applicable discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

10.3.3.2. Contractor's costs for unloading and handling on the Site. Labor and installation costs, have been included in the Contract Price.

10.3.4. If the allowances include the cost of furnishing and installing material or equipment to be furnished and installed by the Contractor the allowances include the cost to Contractor (less any applicable discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes plus the total cost of installation including unloading and handling.

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10.3.5 If the allowances include the cost of furnishing and installing material or equipment to be furnished and installed by a Subcontractor the allowances include the cost to the Contractor of the subcontractor's price.

10.3.6 Unless otherwise provided in the Contract Documents, insurances and bonds do not form part of the allowance price, but are included as part of the Contract Price.

10.3.7 An appropriate Change Order/Extra Work Order will be issued to reflect any difference in the actual cost of the allowance versus the amount specified in said allowance in the Contract Documents. Said amount will be due to Contractor, or credited to Owner as the case may be, on account of Work covered by allowances, and the Contract Price, and Contract Time, if necessary, shall be correspondingly equitably adjusted. Said Change Order/Extra Work Order will include the costs of bonds, insurances and fee stated in Article 10.5. If the change order is a credit, the amount credited will be the net amount due the Owner.

10.4 Unit Price Work

10.4.1 Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include, for all Unit Price Work, an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

10.4.1.1. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of bids and determining an initial Contract Price.

10.4.1.1.1. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Owner's Representative subject to the provisions of Article 13.2.1.

10.4.2 Each unit price will be deemed to include an amount considered by Contractor in the proposal to be adequate to cover Contractor's overhead and profit for each separately identified item.

10.4.3 Owner and Contractor may make a Claim for an adjustment in the Contract Price in accordance with Article 11.5 if:

10.4.3.1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

10.4.3.2. there is no corresponding adjustment with respect any other item of Work; and

10.4.3.3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

10.5 Contractor's Fee: The Contractor's fee for overhead and profit for Work performed under a Change Order/Extra Work Order shall be determined as follows:

10.5.1. a mutually acceptable fixed fee; or

10.5.2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

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10.5.2.1. for costs incurred under Articles 10.2.1.1 and 10.2.1.2, the Contractor's fee shall be fifteen (15) percent;

10.5.2.2. for costs incurred under Article 10.2.1.3, 10.2.1.4 and 10.2.1.5, the Contractor's fee shall be ten (10) percent;

10.5.2.3. where one (1) or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Article 10.5.2.1 is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of fifteen (15) percent of the costs incurred by such Subcontractor under Articles 10.2.1.1 and 10.2.1.2 and that any higher tier Subcontractor and Contractor will each be paid a fee often (10) percent of the amount paid to the next lower tier Subcontractor;

10.5.2.4. no fee shall be payable on the basis of costs itemized under Articles 10.1.2.1 and 10.1.2.2;

10.5.2.5. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost; and

10.5.2.6. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed based on the net change in accordance with Article 10.5.2.1 through 10.5.2.5, inclusive.

ARTICLE 11 - CHANGES IN THE WORK

11.1 Authorized Changes in the Work

11.1.1 Without invalidating the Agreement and without notice to any surety, Owner, through the Owner's Representative, may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Written Amendment, a Change Order, an Extra Work Order, Work Change Directive, or a Construction Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved, which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

11.1.2 If there is agreement that said request will include an adjustment either in the Contract Sum, the Contract Time, or both, the adjustment shall be based on one of the following methods:

11.1.2.1. Mutual acceptance of a lump sum properly itemized and supported with sufficient substantiating data and documentation to permit evaluation and mutually acceptance of adjustment to Contract Time, and Contract Price if necessary;

11.1.2.2. Contract Price and Contract Time to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage Contractor's fee; or

11.1.2.3. As provided in Articles 9.2 and 10.

11.1.3 The Owner's Representative shall have authority to order minor changes in the Work not involving any adjustment in the Contract Sum or an extension of the Contract Time and not inconsistent with the intent of the Contract Documents.

11.1.3.1. Such changes shall be made by a written Field Order, or by other written orders.

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11.1.3.2. Such changes shall be binding on the Owner and the Contractor.

11.1.3.2.1. If the Contractor is not in agreement that such order does not increase either the Contract Sum or the Contract Time, the Contractor shall promptly present his Claim in the method specified in Article 11.5, herein.

11.1.4. The Owner's Representative may issue written Field Orders covering minor changes in the Work without change in Contract Sum or Contract Time.

11.1.4.1. If the Contractor is not in agreement that such Field Order does not increase either the Contract Sum or the Contract Time, he shall promptly present his claim in the method specified in Article 11.5, herein.

11.1.5. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Time, or both, that should be allowed as a result of a Work Change Directive or a Construction Change Directive, a claim may be made therefore as provided in Article 11.5.

11.2 Unauthorized Changes in the Work

11.2.1. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Time with respect to any Work performed that is not required by the Contract Documents as amended, modified, or supplemented, except in the case of an emergency as provided in Article 14.13 or in the case of testing and/or uncovering Work as provided in Articles 12.3 and 12.4.

11.3 Execution of Change Orders and Extra Work Orders

11.3.1. Owner and Contractor shall execute appropriate written Change Orders and/or Extra Work Orders (or Written Amendments) recommended by Owner's Representative covering:

11.3.1.1. changes in the Work, which are:

11.3.1.1.1. ordered by Owner's Representative pursuant to Article 11.1;

11.3.1.1.2. required because of acceptance of defective Work under Article 12.7.1 or Owner's Representative's correction of defective Work under Article 12.8; or

11.3.1.1.3. agreed to by the parties;

11.3.1.2. changes in the Contract Price or Contract Time which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive or a Construction Change Directive; and

11.3.1.3. changes in the Contract Price or Contract Time which embody the substance of any written decision rendered by Owner's Representative pursuant to Article 11.5; provided that in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws or Regulations, but during any such appeal of the Dispute, Contractor shall carry on the Work and adhere to the Progress Schedule and the Owner shall pay for such work performed subject to final resolution of the Dispute.

11.3.1.4. Owner, with the approval of the Change Order/Extra Work Order, shall submit written evidence to the Contractor that the money to pay for said Change Order Work has been assigned to make payment under the Contract.

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11.4 Notification to Surety

11.4.1. If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to Contract Price or Contract Time) is required by the provisions of any Bond to be given to a surety, the giving of any such notice will be Contractor's responsibility. The penal sum of each applicable Bond will be adjusted to reflect the effect of any such change.

11.4.1.1. Owner shall submit to the pertinent government agencies any documentation required by law or regulation to be submitted for the validity or enforceability of any Change Order Work, and shall provide proof of the proper submittal of said documentation if requested in writing by the Contractor.

11.5 Claims and Disputes

11.5.1. Written notice stating the general nature of each Claim, Dispute, or other matter shall be delivered by Contractor to Owner, through Owner's Representative, promptly (but in no event later than 30 days) after the start of the event giving rise thereto.

11.5.1.1. Notice of the amount or extent of the Claim, Dispute, or other matter with supporting data shall be delivered to the Owner within sixty (60) days after the end of such event (unless Owner's Representative allows additional time for claimant to submit additional or more accurate data in support of such Claim, dispute, or other matter).

11.5.1.2. A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Article 11.1.2.

11.5.1.3. A Claim for an adjustment in Contract Time shall be prepared in accordance with the provisions of Article 9.2.2.

11.5.1.4. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event.

11.5.2. If the Dispute is not decided by the Owner's Representative, or said decision notified to Contractor within thirty (30) days following the receipt of the notice of Dispute by the Owner's Representative, the Claim shall be deemed rejected.

11.5.3. Owner's Representative's Decision: Owner's Representative will render a formal decision in writing within thirty (30) days after receipt of the submittal of the Claim. Owner's Representative's written decision regarding the Dispute, or other matter, will be final and binding upon Owner and Contractor unless:

11.5.3.1. An appeal from Owner's Representative's decision is taken within the time limits and in accordance with the dispute resolution procedure set forth in Article 16.

11.5.4. No Claim for an adjustment in Contract Price or Contract Time (or Milestones) will be valid if not submitted in accordance with this section 11.5.

ARTICLE 12 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

12.1 Notice of Defects

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12.1.1. Prompt notice of all defective Work of which Owner, Owner's Representative and Architect/Engineer has actual knowledge will be given to Contractor. If no notice is promptly given to Contractor of previously known defective Work, it shall be deemed acceptable to Owner.

12.1.2. All defective Work may be rejected, corrected, or accepted as provided in this Article.

12.2 Access to Work

12.2.1. Owner, Owner's Representative, Architect/Engineer, Architect/Engineer's Consultant, other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspecting, and testing. Said access shall be previously coordinated with Contractor.

12.2.1.1. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's Site safety procedures and programs so that they may comply therewith as applicable.

12.3 Tests and Inspections

12.3.1. Inspection of Materials

12.3.1.1. Unless otherwise specified in the Contract Documents, all materials are subject to inspection, sampling, testing, retesting and rejection by the Owner's Representative as provided in the specifications and prior to acceptance of the Work.

12.3.1.2. Any work in which untested and unaccepted materials are used without the approval of the Owner's Representative, except if said material is the one specified in the Contract Documents, will be performed at the Contractor's risk.

12.3.1.1.2.1. Material found to be unacceptable will not be paid for and, if directed by the Owner's Representative, shall be removed at the Contractor's expense.

12.3.1.3. Unless otherwise indicated in the Contract Documents, the sampling of materials for testing will be performed by Owner's Representative personnel or by other personnel designated by the Owner, at Owner's expense.

12.3.1.1.3.1. Where sampling by the Contractor is specified, the samples shall be taken using approved Contractor furnished sampling devices, under the supervision of the Owner's Representative, and at such times or intervals as directed.

12.3.1.1.3.2. When materials are tested by the Owner, copies of the test reports will be furnished to the Contractor. Unless otherwise required in the Contract Documents, tests may or may not be performed by Owner and the Contractor shall not rely on the results of the Owner testing being available for process control.

12.3.1.4. Plant Inspection: Owner's Representative may undertake the inspection of materials at the production plant. In the event plant inspection is undertaken the following conditions shall be met:

12.3.1.1.4.1. The Owner's Representative shall have the cooperation and assistance of the Contractor and the producer with whom he has contracted for materials.

12.3.1.1.4.2. The Owner's Representative shall have full entry at all times to such parts of the plant as may

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concern the manufacture or production of the materials being furnished.

12.3.1.1.4.3. Adequate safety measures shall be provided and maintained.

12.3.2 Contractor shall give Owner's Representative timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspections and testing personnel to facilitate required inspections or tests. No delays, or hindrance in the performance of the Work, shall be caused by tardiness in Owner's Representative's inspection of the Work.

12.3.2.1. The Contractor shall submit to the Owner's Representative, within twenty (20) calendar days following the date of Notice to Proceed, the name of the local testing laboratory (ies) proposed for use with respect to the Work.

12.3.2.1.1. The Owner's Representative shall, within ten (10) calendar days after receipt of the submittal of the proposed testing laboratory(ies), approve said laboratory (ies), or submit written reasons for his disapproval.

12.3.2.1.2. If no notice of approval or disapproval is received within said period of time, Contractor shall submit the request for approval to the Chief of Construction or equivalent division head of Owner who shall have ten (10) calendar days to issue his decision. If the Chief of Construction or equivalent division head of Owner does not render his decision within said time, the testing laboratory (ies) will be deemed approved by the Owner's Representative.

12.3.3. Unless otherwise provided in the Contract Documents, Owner's Representative shall employ and pay for the services of independent testing entities to perform all inspections, tests, or approvals required by the Contract Documents except for inspections, tests, or approvals covered by Article 12.3.4. The costs incurred in connection with tests or inspections conducted pursuant to Article 12.4.2.1 shall be paid as provided in Article 12.4.

12.3.3.1 Whenever Contractor is responsible for arranging, obtaining and paying for costs in connection with any inspection, test, or approval required for Owner's Representative's or Architect/Engineer's acceptance of materials, mix designs, or equipment, the inspecting or testing entity shall be submitted for approval by Owner's Representative and the inspection or test shall be performed prior to Contractor purchasing such materials, mix designs, or equipment for incorporation to the Work.

12.3.3.1.1. Unless otherwise indicated in the Contract Documents, such inspections, tests, or approvals shall be performed by organizations acceptable to Owner, Owner's Representative and Architect/Engineer, whose acceptance shall not be unreasonably denied.

12.3.4. If Laws or Regulations of any public body having jurisdiction, at bid opening date, require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Owner's Representative the required certificates of inspection or approval. If said Laws and Regulations are enacted after bid opening date, the costs for said inspections shall be borne by the Owner.

12.4 Uncovering Work

12.4.1. If a portion of the Work, whether or not inspected, tested or approved is covered contrary to the Owner's Representative written request or to requirements specifically expressed in the Contract Documents,

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it must, if required in writing by the Owner's Representative be uncovered for the Owner's Representative observation and be replaced or reconstructed at the Contractors expense without change in the Contract Time and Amount.

12.4.2. If a portion of the Work whether or not inspected, tested or approved has been covered and the Owner's Representative had not specifically required its inspection in writing prior to being covered, the Owner's Representative may required its inspection and it shall be uncovered by the Contractor.

12.4.2.1. If it is found that such Work is defective, Contractor shall pay all Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others.)

12.4.2.2. If however, such Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Time (or Milestones), or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction.

12.5 Correction or Removal of Deficient Work

12.5.1. Contractor shall correct all deficient Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Owner's Representative's, remove it from the Project and replace it with Work that is not deficient. Contractor shall bear, exclusively, the cost of correcting such deficient Work.

12.6 Correction Period

12.6.1. If within one (1) year after the date of Substantial Completion or such longer period of time as may be prescribed by Laws or Regulations or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents, any Work is found to be deficient; or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations, at the Effective Date of the Agreement, as contemplated in Article 6.11.1 is found to be deficient, in all such instances Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

12.6.1. 1. repair such deficient land or areas; or

12.6.1.2. correct such deficient Work or, if the deficient Work has been rejected by Owner, remove it from the Project and replace it with Work that is not deficient, and

12.6.1.3. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or other's land or areas resulting therefrom.

12.6.1.3.1. If Contractor does not, after a ten (10) day written notice from Owner, promptly start complying and diligently comply with the terms of such instructions, (or in an emergency where delay would cause serious risk of loss or damage), Owner may have the deficient Work corrected or repaired or may have the rejected Work removed and replaced, and all costs, arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.

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12.6.2. In special circumstances where a particular item of equipment is placed in continuous service, at the request of the Owner's Representative, before Substantial Completion of all the Work, the correction period for that item shall start to run from the date that said equipment is placed on service.

12.6.3. Where deficient Work (and damage to other Work resulting there from) has been corrected or removed and replaced under this section 12.6, the correction period hereunder with respect to such Work will be extended for an additional period of one (1) year after such correction or removal and replacement has been satisfactorily completed.

12.7 Acceptance of Non-Compliant Work

12.7.1. If both parties agree, instead of requiring correction or removal and replacement of deficient Work, and Owner (prior to Architect/Engineer's recommendation of final payment) prefers to accept it, Owner may do so.

12.7.1.1. If both parties cannot reach agreement on acceptance of deficient work, then the Contractor shall correct such deficient Work to Owner's satisfaction or either party may make a Claim as provided in Article 11.5.

12.7.2. If any such acceptance occurs prior to Owner's Representative's recommendation of final payment, a Change Order/Extra Work Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted.

12.7.2.1. If the parties are unable to agree as to the amount thereof, either party may Claim as provided in Article 11.5.

12.8 Owner's Right to Correct Deficient Work

12.8.1. If Contractor fails within a reasonable time after written notice from Owner's Representative to start correction of deficient Work or to diligently prosecute correction or to remove and replace rejected Work as required by Engineer in accordance with Article 12.6.1, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to substantially comply with any other provision of the Contract Documents, Owner may, after seven (7) days written notice to Contractor, correct and remedy any such deficiency.

12.8.2. In exercising the rights and remedies under this paragraph, Owner shall proceed expeditiously.

12.8.2.1. In connection with such corrective and remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere.

12.8.2.2. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Architect/Engineer and Architect/Engineer's Consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.

12.8.3. All costs incurred or sustained by Owner in exercising the rights and remedies under this Article 12.8 will be

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charged to Contractor.

12.8.3.1. If the parties are unable to agree as to the amount of the adjustment, a Claim therefore may be made as provided in Article 11.5.

12.8.3.1.1. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's deficient Work.

12.8.4. Contractor shall not be allowed an extension of the Contract Time (or Milestones) because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Article 12.8.

ARTICLE 13 - PAYMENTS AND COMPLETION

13.1 Proposal Schedule and Schedule of Values

13.1.1. Proposal Schedule (Unit-Price Contracts)

13.1.1.1. In Unit-Price Contracts, the quantities in the proposal schedule are approximate only and the actual quantities to be paid for cannot be determined until the work is performed and accepted. Increases or decreases in the proposal schedule quantities will be considered as normal overruns or underruns, and the Contractor shall accept as payment in full, so far as contract items are concerned, payment at the original contract unit prices for the accepted quantities of work performed.

13.1.1.2. Payments to the Contractor shall be made only for the actual quantities of each contract item, performed and accepted in accordance with the plans and specifications and, if upon completion of the construction, these actual quantities shall show either a decrease or increase from the quantities in the proposal schedule, the contract unit prices will prevail.

13.1.1.2.1. In Unit-Price Contracts, the Contractor will submit for approval to the Owner's Representative a schedule of values for those Lump-Sum bid items only.

13.1.1.2.2. This schedule, when approved by the Owner's Representative, shall be used solely as a basis for the monthly partial payments.

13.1.1.3. If the "Basis of Payment" in the specifications relating to any unit price in the bid schedule requires that said unit price cover and be considered compensation for certain work or material essential to the item, this same work or material will not also be measured or paid for under any other pay item which may appear elsewhere in the Contract Documents.

13.1.2. Schedule of Values (Lump-Sum Contracts)

13.1.2.1. In Lump-Sum Contracts, the Contractor, within fifteen (15) days after the date of the Notice to Proceed, will submit for approval, to the Owner's Representative, a schedule of values prepared in approved forms of the various portions of the Work aggregating the total Contract Sum, divided so as to facilitate monthly partial payments.

13.1.2.2. Each item in the schedule of values shall include its proper share of overhead and profit. Initial disbursements items such as mobilization, temporary facilities, premiums for insurance, and bonds and all cost of government fees and permits required for work, shall be separately itemized to facilitate first partial payment.

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13.1.2.3. This schedule, when approved by the Owner's Representative, shall be used solely as a basis for the monthly partial payments and not as unit prices for changes in the Work.

13.1.2.4. The schedule of values shall be approved, or rejected in writing for cause notified to Contractor within fifteen (15) calendar days after receipt by Owner's Representative.

13.1.2.4.1. Any individual item on the schedule of values that is rejected by the Owner's Representative must be properly identified and reason for rejection substantiated and notified to the Contractor within said time period.

13.1.2.4.2. The Owner's Representative may allow certain individual items to appear in the schedule of values as lump sum items. These items must be broken down into individual items prior to request any partial payment regarding said individual item.

13.1.2.5. If the Owner's Representative does not reject the schedule of values as specified herein, then the same shall be deemed approved.

13.2 Progress Payments

13.2.1. Applications for Payments

13.2.1.1. The Progress Payment Period shall be one (1) month long unless otherwise indicated in the Contract Documents. The end of the Progress Payment period shall be the last day of the month unless otherwise established in the Contract Documents. The Contractor does not have to submit an application for payment every month if he so chooses.

4 13.2.1.2. At least twenty (20) days before the date established for each progress payment, Contractor shall submit to Owner's Representative for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents.

13.2.1.3. The determination of quantities of acceptable completed Work under the terms of the Contract Documents will be jointly made by the Owner's Representative and Contractor. It will be based on measurements made by them, or their assistants, according to the units of measurement for each item as shown in the schedule of values and by the method indicated in the corresponding specification, if so indicated in said specification for said item.

13.2.1.4. If the requested payment is based on materials and equipment not incorporated in the Work, but delivered and suitably stored at the Site, or at another location, agreed to in writing, the Application for Payment shall also be accompanied by: (i) a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and (ii) evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein. All evidence required herein shall be in form satisfactory to Owner.

13.2.1.4.1. Such advance payment may be made to the Contractor for the cost of materials that are to be incorporated into the work, provided the materials meet the requirements of the plans and specifications and are on hand at the Site or stored in acceptable storage places.

13.2.1.4.1.1. No advance payment will be made on living or perishable plant materials.

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13.2.1.4.1.2. In the case of materials that have been purchased by the Contractor, the cost shall be determined by the vendors invoice.

13.2.1.4.1.3. In the case of materials manufactured or obtained by the Contractor through the use of his own workmen or equipment, the cost will be determined by the Owner's Representative in accordance with and based upon that particular unit of the Project in which the materials are to be utilized.

13.2.1.4.2. The Contractor shall present signed receipts or other documentary evidence to prove that the cost of the materials for which he is to receive advance payment has been paid in full or, if the materials have not been paid for, the invoice shall be accompanied by a release from the materials dealer expressing his agreement with the payment for such materials to the Contractor by the Owner.

13.2.1.4.3. If at any time after the Contractor has received advance payment for materials on hand at the Site, the Owner or Owner's Representative obtains evidence indicating that said materials, or any part or parts thereof, are defective, or that said materials, or parts thereof, do not conform to the specifications, the Owner will proceed to deduct from any of the succeeding partial payments due the Contractor for work actually performed, a sum sufficient to cover the cost of the materials, or part or parts thereof, found to be defective.

13.2.1.4.4. Materials for which the Contractor has received advance payment shall be properly housed at the Site or in acceptable storage places in the vicinity of the Project in a secure manner that will insure the preservation of their quality and fitness for the Work.

13.2.1.4.4.1. Moreover, the Contractor shall not withdraw said materials for any purpose other than incorporation into the Project, unless he has written consent from the Owner or Owner's Representative to do so.

13.2.1.4.4.2. Storage and protection costs and the cost of replacing lost or damaged materials shall be borne by the Contractor.

13.2.1.4.5. Approval of partial payments for stockpiled materials will not constitute acceptance of such materials for use in completing items of Work.

13.2.1.4.6. An amount equal to the value of materials incorporated into the Work and for which an advance payment has been made, shall be deducted from the partial estimates.

13.2.1.4.7. Unless otherwise specified in the Contract Documents, Payment shall be made to the Contractor for materials fabricated, pre-cast or otherwise produced for the Project and stored at an approved site in Puerto Rico other than in the immediate vicinity of the Project, provided the Contractor furnish and file with the Owner insurance which shall protect the Contractor and the Owner from all risk of physical loss or damage to these materials.

13.2.1.4.7.1. The amount of such insurance shall not be less than the value of such materials.

13.2.2. Retainage

13.2.2.1. The amount of retainage with respect to progress payments shall be as stipulated in the bid documents.

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13.2.2.1.1. Unless otherwise specified in the Contract Documents, such retainage shall be five percent (5%) of each partial payment made to the Contractor.

13.2.2.1.1.1. In cases in which a ten percent (10%) Retainage is required by Owner, then after fifty percent (50%) of the Work has been completed to the Owner's Representative's satisfaction and the Project is on schedule and the quality of Work is satisfactory to the Owner's Representative, all the remaining payments may be made in full.

13.2.2.1.2. Immediately after the Owner's Representative, on the basis of an inspection, has determined and certified that the Work is sufficiently complete, or the Work has been occupied for the use for which it was intended, the Owner will release to the Contractor fifty percent (50%) of the amount previously retained provided the following conditions are met.

13.2.2.1.2.1. A written consent of Surety to make such payment is submitted.

13.2.2.1.2.2. There are no claims to be settled from the Owner to the Contractor.

13.2.2.1.2.3. There are no liquidated damages due.

13.2.2.1.2.3.1. However, at Owner's discretion, the Owner may release to Contractor the difference between fifty percent (50%) of the retainage and the amount of liquidated damages.

13.2.3. Review of Applications

13.2.3.1. The Owner's Representative will review the Application for Payment as soon as it is received and will notify the Contractor within five (5) working days of any exceptions he may have. The Contractor will make the necessary corrections and resubmit the Application.

4 13.2.3.2. The Owner's Representative will, within seven (7) days of the Contractor's date of submittal or five (5) days from the date of resubmission, if the corrections are acceptable, submit the approved Application for Payment to the Owner with all required documentation and approvals from the Architect/Engineer and the Owner's Representative.

13.2.3.3. Owner's Representative's recommendation of any payment requested in an Application for Payment will constitute a representation by Owner's Representative to Owner, based on Owner's Representative's observations on the Site of the executed Work as an experienced and qualified professional and on Owner's Representative's review of the Application for Payment and the accompanying data and schedules, that to the best of Owner's Representative's knowledge, information and belief.

13.2.3.3.1. the Work has progressed to the point indicated

13.2.3.3.2. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent test called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work, and to any other qualifications stated in the recommendation); and

13.2.3.3.3. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled

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in so far as it is Owner's Representative's responsibility to observe the Work.

13.2.3.4. By recommending any such payment, Owner's Representative will not thereby be deemed to have represented that:

13.2.3.4.1. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Owner's Representative in the Contract Documents; or

13.2.3.4.2. that there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

13.2.3.5. Neither Owner's Representative's review of Contractor's Work for the purposes of recommending payments nor Owner's Representative's recommendation of any payment, including final payment, will impose responsibility on Owner's Representative to supervise, direct, or control the Work or for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work.

13.2.3.5.1. Additionally, said review or recommendation will not impose responsibility on Owner's Representative to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

13.2.3.6. Owner's Representative may refuse to recommend in whole or in part of any payment if, in Owner's Representative's reasonable opinion, it would be untruthful to make the representations to Owner referred to in Article 13.2.3.3.

13.2.3.6.1. Owner's Representative may also (i) refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, (ii) revise or (iii) revoke any such payment recommendation previously made, to such extent as may be necessary in Owner's Representative's reasonable opinion to protect Owner from loss because:

13.2.3.6.1.1. the Work is defective, or completed Work has been damaged, requiring correction or replacement;

13.2.3.6.1.2. the Contract Price has been reduced by Written Amendment, Change Orders or Extra Work Orders to the extent that justifies withholding payment;

13.2.3.6.1.3. Owner has been required to correct deficient Work or complete Work and has not yet done so; or

13.2.3.6.1.4. Owner's Representative has actual knowledge of the occurrence of any of the events enumerated in Article 15.2.1.

13.2.4. Payments Becomes Due

13.2.4.1. Unless otherwise specified in the Contract Documents, forty (40) days after Owner's approval of the Application for Payment, with Owner's Representative's recommendation, the amount recommended will become due, and when due, shall be paid by Owner to Contractor.

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13.2.5. Reduction in Payment

13.2.5.1. The Owner's Representative, without incurring in liability, may decline to approve any Application for Payment or, because of subsequently discovered evidence or subsequent inspection, he may nullify the whole or any part of any Application for Payment previously issued, to such extent as may be necessary in his opinion to protect the Owner from loss because of:

13.2.5.1.1. Deficient Work not remedied; or

13.2.5.1.2. Failure of the Contractor to comply with any requirements of the Contract Documents.

13.2.5.2. Owner may refuse to make payment of the full amount recommended by Owner's Representative because:

13.2.5.2.1. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;

13.2.5.2.2. Liens have been filed in connection with the Work, except where Contractor has delivered a specific Bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;

13.2.5.2.3. there are other items entitling Owner to a set-off against the amount recommended; or

13.2.5.2.4. Owner has actual knowledge of the occurrence of any of the events enumerated in Article 13.2.3.6 or 15.2.1.

13.2.5.3. If Owner refuses to make payment of the full amount recommended by Owner's Representative, Owner must give Contractor immediate written notice (with a copy to Owner's Representative) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld.

13.2.5.3.1. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor corrects to Owner's Representative's satisfaction the reasons for such action.

13.2.5.3.2. If it is subsequently determined that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Article 13.2.4.

13.2.5.4. Partial payments may be suspended when in the judgment of the Owner the Work has not proceeded according to the terms of the Contract Documents.

13.2.5.5. If at any time during the construction of the Project, the Owner receives proper notice from a third party stating a claim under Civil Code Article 1489, the Contractor shall settle the claim with the third party within fifteen (15) calendar days from the notice to the Owner and inform the Owner of said settlement or otherwise if Contractor disputes the validity of said claim, post a bond, acceptable to Owner, for the benefit of Owner to protect Owner against liability for payment to the third party under Civil Code Article 1489 in which case partial payment therefore will not be withheld. This will apply in any project where there is no Payment or Performance Bond, or the penal sum of such bond is an amount less than one hundred (100) percent of the Contract Sum.

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13.2.5.5.1. If no settlement is reached or a bond is not posted and accepted, the Owner, the Contractor, and the claimant third party shall meet within thirty (30) days after the expiration of the fifteen (15) calendar days to ascertain the amount of the alleged debt.

13.2.5.5.2. Contractor shall then pay within five (5) calendar days the undisputed amount. If no payment is made, the Owner shall retain said amount from the next partial payment and proceed to pay directly the undisputed amount to the third party. If the Contractor posts a bond as provided in Article 13.2.5.5 the Owner will not withhold said amount from Contractor and will not pay the amount to the third party claimant until the Contractor or the third party claimant notify Owner that the dispute among them has been resolved at which time Owner will act accordingly.

13.2.6. Scope of Payment

13.2.6.1. The payment of any partial estimate or of any retained percentage, in no way shall release the obligation of the Contractor to renew or repair any deficient materials used in the construction, or to be responsible for all damage due to such deficiencies.

13.2.6.2. No payment will be made for any unauthorized work.

13.2.6.3. No certificate for a progress payment, nor any progress payment, or any partial or entire use or occupancy of the Project by the Owner shall constitute an acceptance of any Work not in accordance with the Contract Documents.

13.3 Contractor's Warranty of Title

13.3.1. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment, and will pass free and clear of all Liens, Claims, security interests or encumbrances. Contractor also warrants and guarantees that no Work, materials, or equipment covered by an Application for Payment has been acquired by the Contractor, subject to an agreement under which an interest therein, or an encumbrance thereon, is retained by the seller or otherwise imposed by the Contractor or such other person. This will also apply to any other person performing the Work for the Project on behalf of Contractor, or furnishing materials and equipment for the Project.

13.4 Substantial Completion

13.4.1. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Owner's Representative in writing that the entire Work is Substantially Complete (except for items specifically listed by Contractor as incomplete) and request that Owner's Representative issue a Certificate of Substantial Completion. Owner may, at its sole option, request that part of the Work be declared Substantially Complete as provided in Article 13.5.1.

13.4.1.1. Within five (5) working days after such request, Owner, Contractor and Owner's Representative shall make an inspection of Work to determine the state of completion. If within this time period, the Owner's Representative fails to make objections or respond, the Contractor shall request the approval of the Chief of Construction or equivalent division head of Owner which shall have fifteen (15) working days to issue its approval or disapproval of the Certificate of Substantial Completion.

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13.4.1.1.1. If Owner's Representative does not consider the Work substantially complete, Owner's Representative will notify Contractor in writing, within five (5) working days after the inspection, giving the reasons therefore.

13.4.1.1.2. If Owner's Representative considers the Work substantially complete, Owner's Representative will prepare and deliver to Owner, within ten (10) working days after the inspection, a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion.

13.4.1.1.3. There shall be attached to the certificate a tentative list of items (punch list) to be completed or corrected before final payment.

13.4.1.2. Owner shall have ten (10) working days after receipt of the tentative certificate during which to make written objection to Owner's Representative as to any provisions of the certificate of Substantial Completion or attached list.

13.4.1.3. If, after considering such objections, indicated on Article 13.4.1.2, Owner's Representative concludes that the Work is not substantially complete, Owner's Representative will within fifteen (15) working days after submission of the tentative certificate of Substantial Completion to Owner notify Contractor in writing, stating the reasons therefore.

13.4.1.4. If, after consideration of Owner's objections, indicated on Article 13.4.1.2, Owner's Representative considers the Work Substantially Complete, Owner's Representative will, within said fifteen (15) working days, execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised final punch list of items to be completed or corrected). Such final certificate will reflect such changes from the tentative certificate as Owner's Representative believes justified, after consideration of any objections from Owner.

13.4.1.5. At the time of issuance of the certificate of Substantial Completion, Owner will assume all responsibilities with respect to security, operation, safety, and protection of the Work, maintenance, utilities, insurance, and Contractor warranties and guarantees periods will start to run.

13.4.1.6. Unless Owner and Contractor agree otherwise in writing and inform Owner's Representative also in writing prior to Owner's Representative's issuing the definitive certificate of Substantial Completion, Owner's Representative's aforesaid recommendation will be binding on Owner and Contractor until final payment is made.

13.4.2. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion, but Owner shall allow Contractor reasonable access to complete or correct items on the final punch list.

13.5 Partial Utilization

13.5.1 Use by Owner, at Owner's option, of any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Owner's Representative, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose, without significant interference with Contractor's performance of the remainder of the Work, may be effected (put to such use) prior to Substantial Completion of all the Work subject to the following:

13.5.1.1. Owner at any time may request Contractor in writing to permit Owner to use any such part of the Work which Owner believes to be ready of its intended use and substantially complete.

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13.5.1.1.1. If Contractor agrees that such part of the Work is substantially complete, Contractor will certify to Owner and Owner's Representative that such part of the Work is substantially complete and request Owner's Representative to issue a certificate of Substantial Completion for that part of the Work.

13.5.1.1.2. Contractor at any time may notify Owner and Owner's Representative in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Owner's Representative to issue a certificate of Substantial Completion for that part of the Work.

13.5.1.1.2.1. Within a reasonable time (not more than fifteen (15) days) after either party's request, Owner, Contractor, and Owner's Representative shall make an inspection of that part of the Work subject to the request to determine its state of completion.

13.5.1.1.2.2. If Owner's Representative does not consider that part of the Work to be substantially complete, Owner's Representative will notify Owner and Contractor in writing giving the reasons therefore.

13.5.1.1.2.3. If Owner's Representative issues a certificate of Substantial Completion for said part of the Work thereupon all applicable provisions of Article 13.4 shall apply.

13.5.1.1.3. No occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Article 13.4.1.5 regarding property insurance.

13.6 Final Inspection

13.6.1. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Owner's Representative will, within five (5) working days, make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars this inspection reveals with regard to incomplete or deficient Work.

13.6.1.1. Contractor shall immediately take measures to complete such Work and remedy such deficiencies.

13.7 Final Payment

13.7.1. Application for Payment

13.7.1.1. After Contractor has, in the opinion of Owner's Representative, satisfactorily remedied all incomplete and deficient Work identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, Bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents, and other documents required by the Contract, Contractor may make application for final payment following the procedure for progress payments.

13.7.1.2. The final Application for Payment shall be accompanied, except if previously delivered to Owner's Representative, by:

13.7.1.2.1. all documentation, guarantees, Bonds and insurance called for in the Contract; and

13.7.1.2.2. consent of the surety, if any, to final payment; and

13.7.1.2.3. complete and legally effective releases, or waivers, (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.

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13.7.1.3. In lieu of the releases or waivers of Liens specified in Article 13.7.1.2.3, if approved by Owner, Contractor may furnish payment receipts or releases in full as part of an affidavit executed by Contractor to the effect that:

13.7.1.3.1. the releases and receipts include all liabilities related to labor, services, material, and equipment for which a Lien could be filed; and

13.7.1.3.2. all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner and Owner's property might in any way be responsible, have been paid or otherwise satisfied.

13.7.1.3.3. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a Bond or other collateral satisfactory to Owner to indemnify Owner against liability related to any such Lien.

13.7.2 Review of Final Application for Payment and Acceptance of the Work.

13.7.2.1. If, on the basis of Owner's Representative's observation of the Work during construction and final inspection, and Owner's Representative's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Owner's Representative is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Owner's Representative will, within fifteen (15) days after receipt of the final Application for Payment, indicate to Owner in writing Owner's Representative's recommendation regarding payment and if payment is recommended present the Application for Payment to Owner, for payment.

13.7.2.1.1. At the same time, Owner's Representative will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Article 13.9.

13.7.2.1.2. Otherwise, within the time specified in Article 13.7.2.1, Owner's Representative will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment. If within said fifteen (15) days after submittal of the final Application for Payment by Contractor the Owner's Representative fails to make objections or respond, the Contractor shall request approval directly from the Owner who shall have fifteen (15) working days to issue approval or disapproval, provided Contractor has also given the same timely notice directly to Owner as required in Article 17.3.2. If no reply is forthcoming from the Owner within the stated time, the final Application for Payment shall be deemed approved.

13.7.3. Final Payment Becomes Due

13.7.3.1. Unless otherwise specified in the Contract Documents, forty (40) days after Owner's approval of the Application for Final Payment, with accompanying documentation, the amount recommended by Owner's Representative will become due, and when due, shall be paid by Owner to Contractor.

13.7.3.2. If payment is not made within the time stated in Article 13.7.3.1., thereafter Owner will pay Contractor interest at the legal rate on the amount due.

13.8 Final Completion Delayed

13.8.1. If, through no fault of the Contractor, final completion of the Work is significantly delayed, and if Owner's

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Representative so confirms, Owner shall, upon receipt of Contractor's final Application for Payment and recommendation of Owner's Representative, and without terminating the Agreement, make payment of the balance due for that portion of the Work fully completed and accepted.

13.8.2. If the remaining balance to be held by Owner for Work not fully completed, or corrected, is less than the retainage stipulated in the Agreement, and if Bonds have been furnished as required in Article 3, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Owner's Representative with Application for such payment.

13.8.2.1. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of any claim or of any right under the Contract.

13.9 Waiver of Claims

13.9.1. The making and acceptance of final payment will constitute:

13.9.1.1. a waiver of all Claims by Owner against Contractor, except for Claims arising from unsettled Liens, from deficient Work appearing after final inspection as the result of failure to comply with the Contract Documents, from special guarantees or from Contractor's continuing obligations under the Contract Documents; and

13.9.1.2. a waiver of all other unsettled Claims by Contractor against Owner, other than those previously made in a timely manner in writing.

13.10 Unilateral Liquidation

13.10.1. The procedures established in this section will be applicable whenever the Contractor is not available in order for the Owner to issue the final payment in accordance with Article 13.7.

13.10.1.1. For purposes of this section, the term "unavailable" shall mean that the Contractor repeatedly fails to answer Owner's requests to meet with the Owner and/or to submit the required documentation under Article 13.7 in order to proceed with the final payment and Project liquidation.

13.10.2. If Contractor is unavailable, Owner shall proceed to issue and process the final application for payment. In order to accomplish this, whenever possible, the Owner will seek to obtain the documentation required under Article 13.7.1.2 and 13.7.1.3.

13.10.2.1. When Owner can not obtain documentation required under Article 13.7.1.2 and 13.7.1.3 such documentation it may be waived by Owner in order to proceed to the issuance of final payment. However, in case of such waiver, Owner may impose those reasonable conditions Owner deems relevant in order to protect Owner's interests and safeguard against claims by third parties.

13.10.3. If after finalizing liquidation of the Contract, payment is due Contractor and Contractor remains unavailable, Owner will retain such payment until Contractor is available to collect such payment. If the Final Payment is negative (i.e., the balance is in favor of the Owner), the Owner shall compensate such amount from any other payment in favor of Contractor, if any, and/or proceed to collect it by any means available.

ARTICLE 14 - PROTECTION OF PERSONS AND PROPERTY

14.1 Public Convenience and Safety

14.1.1. The Contractor shall at all times conduct the Work in a manner that insures the public safety and convenience and the protection of persons and property.

14.1.1.1. Contractor shall perform the Work in a manner that will not cause unreasonable inconvenience to the general public.

14.1.2. The Contractor shall comply with all laws, rules, codes and regulations applicable to the class of work being performed pertaining to public safety and the protection of persons and property.

14.2 Laws to be Observed

14.2.1 It is the Contractor's responsibility to be fully informed of and comply with all Federal, Commonwealth and municipal laws, ordinances, safety codes and regulations, and all such orders or decrees presently in effect or that may be enacted prior to Final Acceptance or which in any way affect the prosecution of the Work.

14.2.1.1. The Contractor shall at all times observe and comply with all such laws, ordinances, safety codes, regulations, orders and decrees; and shall protect Owner and its representatives against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by himself, his employees, his subcontractors, his suppliers, his agents, or the employees of any of them or by anyone for whom Contractor is responsible.

14.2.1.2. When the United States Government pays all or any portion of the cost of the Work, the federal laws and the rules and regulations pursuant to such laws, if applicable, must be observed by the Contractor, and the Work may be subject to the inspection by any appropriate federal agency.

14.2.2. All costs related to compliance with all laws, rules and regulations enacted after bid opening date, shall be paid for by the Owner and any resulting adjustment to the Contract Price or the Contract Time shall be made by a Change Order to the Contract.

14.2.2.1. If Owner's Representative and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of any such adjustment, a Claim may be made therefore as provided in Article 11.5.

14.2.2.2. Payment under this paragraph is contingent to those situations not covered under Article 14.4.4.

14.3 Sanitary, Health and Safety Provisions

14.3.1. The Contractor shall comply with all Federal, Commonwealth and local laws, rules and regulations concerning construction safety and health standards and shall admit without delay any inspector from such health and safety agencies upon presentation of proper credentials.

14.3.2. Contractor shall provide and maintain in orderly sanitary condition such facilities as necessary for the use of his employees, in compliance with the Commonwealth Departments of Health and Labor and other bodies having jurisdiction.

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14.3.3. The Contractor shall not require work to be performed under unsanitary, hazardous or dangerous conditions.

14.4 Labor Relations and Wages

14.4.1. The Contractor shall comply with all the applicable Federal and Commonwealth laws, rules and regulations concerning fair labor practices including minimum wages, work hours, equal employment opportunities, non-discrimination, civil rights, employment of minors, and other labor relation matters.

14.4.2. The minimum wage rates to be paid shall be according to the regulations of the Minimum Wage Board of the Puerto Rico Department of Labor as indicated in the latest issue of its mandatory decree at any time during the execution of the Project.

14.4.3. The Contractor shall pay weekly, in lawful money of the United States of America, including payment by check or direct deposit, the entire amount of wages, less legally authorized or mandated deductions, earned by each of the laborers and employees engaged in the Work.

14.4.3.1. The Contractor shall make available to the Owner for inspection the project payrolls and shall submit copies of such payrolls to the Owner when required.

14.4.3.2. Any irregularities noted will be brought to the attention of the Contractor by the Owner for appropriate corrective action and payment of any pending wages.

14.4.3.2.1. Should the Contractor fail to take the necessary action, he will be subject to such civil and criminal proceedings provided by law and regulations.

14.4.3.3. Payment of wages to laborers and employees of the Contractor for their work shall have preference over the payment of other debts of the Contractor, except as otherwise established by law.

A 14.4.4. If during the term of the Contract, federal minimum wages are increased and said increase is applied to Puerto Rico, or if labor costs and/or fringe benefits are increased by local legislation, the cost of the increase in the Work shall be considered as a Change Order and proven cost increases, including fringe benefits and insurance costs, shall be paid to the Contractor, unless those increases have been legislated, or included as part of a resolution, by either the Commonwealth or Federal Legislative chambers prior to the bid opening date. If after the bid opening date, new local legislation or regulation is imposed which directly increases Contractor's costs of materials or transportation, the Contractor may present a Claim under Article 11.5 for such increases. Such increases in costs must be evidenced and substantiated by the Contractor.

14.4.4.1. If Owner's Representative and Contractor are unable to agree as to entitlement, amount or extent, if any, of any such adjustment under Article 14.4.4, a Claim may be made therefore as provided in Article 11.5.

14.5 Environmental Protection

14.5.1. Contractor shall comply with all Federal, Commonwealth and local environmental laws and regulations.

14.5.1.1. Contractor shall take all necessary precautions to prevent pollution of streams, lakes, ponds, and reservoirs with fuels, oil, bitumen, chemicals, or other harmful materials and to prevent pollution of the

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atmosphere with particulate or gaseous matter.

14.5.2. Unless otherwise approved in writing by the Owner, construction operations in rivers, streams, lakes and other bodies of water shall be restricted to those areas where channel changes are shown on the plans and to those areas which must be entered for the construction of temporary or permanent structures.

14.5.2.1. Rivers, streams, lakes and reservoirs shall be promptly cleared of all false work, piling, debris, or other obstructions placed therein or caused by the construction operations.

14.5.3. Frequent fording of live streams with construction equipment will not be permitted. Temporary bridges or other structures shall be used wherever an appreciable number of stream crossings are necessary.

14.5.3.1. Unless otherwise approved in writing by the Owner, mechanized equipment shall not be operated in live streams except as may be required to construct channel changes and temporary or permanent structures.

14.5.4. Contractor shall comply with all the requirements regarding soil erosion and water pollution control included in the Environmental Quality Board's regulations, the Owner's other standard specifications, the Plans and other Contract Documents.

14.5.5. If the Contractor should encounter or expose during construction operations any abnormal condition, which may indicate the presence of a hazardous and/or toxic waste, the Contractor shall proceed in accordance with Article 4.7.

14.5.5.1. Abnormal conditions shall include, but shall not be limited, to the following, presence of barrels, discolored earth, metal or wood; obnoxious or unusual odors; visible fumes; excessively hot earth; smoke; or any other condition which appears to be a possible indication of hazardous and/or toxic waste.

14.6 Construction Over or Adjacent to Navigable Waters

14.6.1. All Work and related activity, over, on or adjacent to navigable waters shall be conducted so that free navigation of the waterways will not be interfered with and that the existing navigable depths and clearances will not be impaired except as allowed by permit issued by the U.S. Coast Guard and/or the U.S. Army Corps of Engineers, as applicable.

14.7 Traffic Protection Devices

14.7.1. The Contractor, when applicable, shall provide, erect and maintain all necessary advance warning signs, barricades, suitable and sufficient lights, danger signals, signs, and other traffic control devices; shall provide a sufficient number of watchmen and flag persons, and shall take all necessary precautions for the protection of the Work and the safety of the public in accordance with the plans and other Contract Documents.

14.8 Use of Explosives

14.8.1. When the use of explosives is necessary for the prosecution of the Work, the Contractor shall comply with all the Laws and Regulations concerning the use, storage, transporting, handling and detonating of explosives.

14.8.1.1. The Contractor shall exercise the utmost care with the explosives so as not to endanger life and

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property and he shall be responsible for any and all damages that may result from his use of explosives.

14.8.2. Prior to initiating the use of explosives, the Contractor shall submit to the Owner evidence that his comprehensive general liability insurance required under Article 3 provides coverage for the use of explosives and blasting.

14.8.3. Blasting operations shall be conducted under the most careful and experienced supervision. The Contractor shall keep the Owner informed as to his drilling, blasting and demolition operations.

14.8.4. The Contractor shall furnish and erect special signs to warn the public of his blasting operations.

14.8.4.1. Such signs shall be placed at appropriate points within the Project limits, shall be maintained so as to be clearly evident to the public during all critical periods of the blasting operations and, if blasting is by means of electric detonators, shall include a warning statement to have radio transmitters turned off.

14.8.5. The Contractor shall notify each property owner and public utility company having structures in the proximity to the Site and the Work of his intention to use explosives.

14.8.5.1. Such notice shall be given sufficiently in advance to enable the parties being warned to take steps necessary to protect persons and property from injury.

14.9 Protection and Restoration of Property

14.9.1. The Contractor shall be responsible for the preservation of all public and private property, and shall carefully protect from disturbance or damages all land monuments and property marks until the Owner has witnessed or otherwise referenced their location, and shall not move them until directed.

14.9.2 When the Contractor's excavating operations encounter items of archeological interest such as remains of pre-columbine people's dwelling sites or artifacts of historical, paleontological or archeological significance, operations in the vicinity of such findings shall be temporarily discontinued and the Owner notified.

14.9.2.1. The Owner will contact the proper authorities to determine the disposition thereof.

14.9.2.2. When directed by the Owner, the Contractor shall excavate the site in such a manner as to preserve the artifacts encountered and shall remove them for delivery to the custody of the proper authorities.

14.9.2.2.1. Such specialized excavation and time delay costs, if any, will be considered and paid for as Extra Work unless the Owner elects to undertake such recovery work by other means.

14.9.2.2.2. If the Owner elects to perform this work by other means, he shall be responsible to the Contractor for costs associated with delay to the Work, only if said delay affects the critical path.

14.9.3 Contractor shall be responsible for all damages or injury to property of any character during the prosecution of the Work resulting from any act, omission, neglect or misconduct in the Contractor's manner or method of executing the Work, or at any time due to deficient work or materials. The Contractor's responsibility will not be released until the Project has been completed and accepted.

14.9.4 When any direct or indirect damage or injury is caused to public or private property by or on account of an

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act, omission, neglect or misconduct in the execution of the work, or as a consequence of the non-execution thereof, by Contractor, such property shall be restored at the Contractor's expense to a condition similar or equal to that existing before such damage or injury was caused by repairing, rebuilding or otherwise restoring the same, or Contractor shall make good such damage or injury in a manner acceptable to owner.

14.9.5 Contractor shall comply with all necessary soil erosion and water pollution control measures, as indicated in the Contract Documents, and shall exercise due care in their implementation, to avoid causing erosion and drainage problems in all areas inside and outside the Project construction limits.

14.10 Forest Protection

14.10.1. In carrying out Work or related activity within or adjacent to Commonwealth or National Forests, the Contractor shall comply with all regulations of the Commonwealth Fire Service, Puerto Rico Department of Agriculture, United States Forest Service or other authority having jurisdiction, governing the protection of forests and the carrying out of Work within forests, and shall observe all sanitary laws and regulations with respect to the performance of work in forest areas.

14.10.1.1. Contractor shall keep all areas affected by construction related activities in an orderly condition, dispose of all refuse, obtain permits for the construction and maintenance of all construction camps, stores, warehouses, residences, latrines, cesspools, septic tanks, and other structures in accordance with the requirements of the agency having jurisdiction of the forest.

14.10.2 The Contractor shall take all reasonable precautions to prevent and suppress forest fires and shall require his employees and subcontractors, both independently and at the request of forest officials, to do all that is reasonably within their power to prevent and suppress and to assist in the prevention and suppressing forest fires. They shall make every possible effort to notify a forest official at the earliest possible moment of the location and extent of any fire seen by them.

14.11 Responsibility for Damage Claims

14.11.1. The Contractor shall indemnify and save harmless the Owner as follows:

14.11.1.1. The Contractor for itself, agents, employees, successors and assigns agrees to save harmless the Owner, its Officers, Agents, Employees and Architect/Engineer from and against any and all claims, demands and/or suits, except as stated below, whether judicial or extra judicial for any cost whatever arising out or related to the execution of the Contract, and its insurers shall defend the Owner, its Officers, agents, Employees and Architect/Engineer from such claims, demands and/or suits and shall bear all the expenses for such defense contemplated within the coverage limits provided by the Contractor's general liability policy, except where such claims, demands and/or suits are due solely to the negligence of the Owner, its Officers, Agents, employees and negligence, errors and/or omissions of the work performed by the Architect/Engineer. In case that the amount to be paid exceeds the policy amount, then the Contractor shall be responsible for the exceeding amount.

14.12 Contractor's Responsibility for Work

14.12.1. Until the final written acceptance of the Work by the Owner, the Work shall be under the charge and care of the Contractor. He shall take every necessary precaution to protect it from injury or damage to any part thereof by the action of the elements or from any other cause whether arising from the execution or non-execution of the Work.

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14.12.2. The Contractor shall rebuild, repair, restore and make good any damages to any portion of the Work occasioned by any of the causes indicated in paragraph 14.12.1, above, before its completion and acceptance, and shall bear the expense thereof, except damages to the Work due to unforeseeable causes beyond the control of and without fault or negligence of the Contractor, including but not restricted to acts of God, such as earthquake, hurricane, tidal wave, major flooding or other cataclysmic phenomenon of nature, acts of the public enemy or of the government.

14.12.3. In case of suspension of Work from any cause whatsoever, the Contractor shall be responsible for the Work under the Contract and shall take such precautions as may be necessary to prevent damage to the Project, provide suitable drainage and erect necessary temporary structures, signs or other facilities.

14.12.3.1. During such period of suspension of work, the Contractor shall properly and continuously maintain in acceptable growing conditions all living material in newly established plantings, seeding, and sodding furnished under his contract, and shall take adequate precautions to protect new tree growth and other important vegetative growth against injury.

14.12.3.2. All costs for the work described above attributable to a suspension by the Owner shall be reimbursed to the Contractor by the Owner.

14.12.3.3. If the temporary suspension of Work is caused by the Contractor, then he will bear the expenses in such event.

14.12.4. When Work is suspended by the Contractor without authorization from the Owner, or is suspended by the Owner due to the fault of the Contractor, the costs of providing the protective measures specified in paragraph 14.12.3, above, during the period of suspension shall be borne by the Contractor.

4 14.13 Emergencies

14.13.1. In any emergency affecting the safety of persons or property, the Contractor shall act at his discretion to prevent damage, injury, or loss.

14.13.1.1. Any additional compensation or extension of time claimed by the Contractor on account of emergency Work shall be determined as provided in Article 11. Additional costs incurred by the Contractor in a case of an emergency need not be authorized by the Owner's Representative when there is insufficient time to seek Owner's authorization.

14.13.2. If an emergency affects the safety of persons or property at the Site or property adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Either the Owner or the Contractor can declare an emergency.

14.13.2.1. Contractor shall give Owner's Representative prompt notice if Contractor believes that any significant changes in the Work or variations from what is provided by the Contract Documents have been caused by the emergency or are required as a result thereof.

14.13.2.1.1. If Owner's Representative determines that an amendment to the Contract Price or Contract Time is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive, a Change Order or an Extra Work Order will be issued.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

15.1 Suspension of Work

15.1.1. At any time and without cause, Owner may, with a minimum of seven (7) calendar days written notice, suspend the Work or any portion thereof for a period of not more than ninety (90) consecutive days by notice in writing to Contractor and Architect/Engineer. Said notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be allowed an adjustment in the Contract Price or an extension of the Contract Time, or both, directly attributable to any such suspension if Contractor makes a timely Claim therefore as provided in Article 11.5. Said adjustment shall be computed based on the following factors:

15.1.1.1. Fixed Project expenses (after all reasonable reduction and mitigation of expenses) for the period of the Work stoppage, such as: (i) the Contractor's and subcontractor's supervisory, administrative, and operations personnel salaries, together with their corresponding fringe benefits and insurance costs if this personnel has been kept in the Contractor's payroll and are not gainfully utilized by Contractor or someone else elsewhere, (ii) utilities, (iii) Project's fixed equipment, and (iv) miscellaneous expenses such as safety, and vigilance.

15.1.1.1.1. At any time during the suspension, the Owner may order the Contractor to demobilize, paying the Contractor the de-mobilization costs and any future mobilization costs to re-start the Project.

15.1.1.1.2. Cancellation costs and cost increases for materials already ordered which had to be canceled and reordered, provided that such costs are not in excess of reasonable market prices.

15.1.1.1.3. Differential increases in labor costs, and its corresponding fringe and insurance benefits, in the Project for the period that the work is stopped.

15.1.1.1.4. Construction equipment use costs for the stoppage period if said equipment remains stationed at the site (idle equipment rates), or transportation costs if the Owner orders in writing that it be removed from the site. If the equipment is owned by the Contractor, he will be paid the cost (depreciation) of said equipment.

15.1.1.1.5. Insurance costs whose rates are based on the time such insurance is in effect, such as Builder's Risk Insurance, for the period that the work is stopped.

15.1.1.1.6. Contractor's overhead and profit in the amount equivalent to fifteen percent (15%) of all expenses detailed above.

15.1.1.1.7. An amount of the Contractor's main office overhead costs (exclusively in this instance and solely related to suspension) reached by mutual accord between the parties or if no mutual accord can be reached, the cost for main office overhead shall be computed using the Eichleay formula using as base the previous two (2) years of Contractor's main office overhead cost taken from the previous two (2) years financial statements which have been externally audited by a recognized CPA. If the Contractor does not have financial statements prepared externally by a recognized CPA, he must prepare them in order to be able to present a claim for this purpose.

15.1.1.1.8. Contractor shall exert his best effort to mitigate the costs included in this Article 15.1.1.

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15.1.2. At any time, the Owner's Representative may, with a minimum of seven (7) calendar days written notice, for the following causes suspend the Work or part of the Work due to:

15.1.2.1. the repeated and persistence failure of the Contractor to perform his contractual obligations;

15.1.2.2. the repeated and persistent failure of the Contractor to have sufficient labor and the trades necessary to maintain the quality and progress required in the Contract Documents;

15.1.2.3. the repeated and persistent failure of the Contractor to have sufficient material necessary to maintain the quality and progress required in the Contract Documents;

15.1.2.4. the repeated and persistent failure of the Contractor to have sufficient equipment and type of equipment necessary to maintain the quality and progress required in the Contract Documents.

15.1.3. The Contractor will be responsible for all of his costs due the suspension of the Work indicated in Article 15.1.2 and there will be no increase in Contract Price or extension to the Contract Time as a result of such suspension for cause.

15.1.3.1. The suspension for cause under Article 15.1.2 will last until the Contractor remedies the situation or until termination.

15.1.3.2. The Contractor shall also be responsible for the inspection costs made necessary by overtime work to restore the project to its intended schedule due to delays caused by the actions mentioned in Article 15.1.2. Said costs will consist of the actual cost paid therefore by and to the inspector, if his presence is required or necessary.

15.1.4. At any time, the Owner's Representative or the Contractor may suspend the work or part of the work without advanced notice due to any danger or potential danger that may exist to life, limb or property or any emergency whether on the Site or off the Site.

15.1.4.1. The Contractor will be responsible for all of his costs due the suspension and there will be no time extension to the Contract Time if the suspension is due to the failure of the Contractor to perform his contractual obligations.

15.1.4.2. The Owner will compensate the reasonable costs incurred by Contractor if the suspension is due to causes other than the failure of the Contractor to perform his contractual obligations and such causes are attributable to Owner.

15.1.5. In case of suspension of Work for any cause whatsoever, the Contractor shall be responsible for the Work under the Contract and shall take such precautions as may be necessary to prevent damage to the Project, provide suitable drainage and erect necessary temporary structures, signs or other facilities.

15.1.5.1. During such period of suspension, the Contractor shall properly and continuously maintain in acceptable growing conditions all living material in newly established plantings, seeding, and sodding furnished under his contract, and shall take adequate precautions to protect new tree growth and other important vegetative growth against injury.

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15.1.5.2. When Work is suspended by the Contractor without authorization from the Owner, or is suspended by the Owner due to the causes specified in Article 15.1.2, the costs of providing the protective measures specified in Article 15.1.5. and 15.1.5.1, during the period of suspension shall be borne by the Contractor.

15.1.5.3. The Contractor will be responsible for all of its costs due to the suspension and there will be no time extension to the Contract Time if the suspension is due to the failure of the Contractor to perform its contractual obligations, or other causes attributable to Contractor.

15.1.5.4 The Owner will compensate the reasonable costs incurred by Contractor if the suspension is due to causes other than the failure of the Contractor to perform his contractual obligations and such causes are attributable to Owner.

15.2 Owner May Terminate for Cause

15.2.1. The occurrence of any one or more of the following events will justify termination for cause:

15.2.1.1. Contractor's persistent or repeated failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the progress schedule established under the Contract, as adjusted from time to time); or

15.2.1.2. Contractor's egregious disregard of Laws or Regulations of any public body having jurisdiction; or

15.2.1.3. Contractor's persistent or repeated disregard of the authority of Architect/Engineer, Owner or Owner's Representative; or

15.2.1.4. Contractor's persistent and repeated violation of any substantial provisions of the Contract Documents; and does not start curing and without interruption continues to cure same prior to termination.

15.2.1.5. Contractor is adjudged bankrupt, or is a party to a fraud; or

15.2.1.6. Contractor should make a general assignment for the benefit of his creditors; or

15.2.1.7. A receiver be appointed on account of the Contractor's insolvency; or

15.2.1.8. An attachment is made upon a substantial amount the Contractor's properties utilized to perform the Work, and it is not lifted, or the claim otherwise secured, within five (5) working days thereafter; or

15.2.1.9. Contractor persistently fails to make prompt payment to subcontractors, as per Article 6.21.2, or for materials, services, or labor already paid to Contractor by the Owner; or

15.2.1.10. Contractor abandons or discontinues the prosecution of the Work without Owner's written authorization.

15.2.1.10.1 Nevertheless, Contractor may discontinue the prosecution of the Work during: (i) Holy Thursday; (ii) the Friday after Thanksgiving; and (iii) the time period commencing on the Saturday before Christmas Day (December 25) and ending on the Sunday after Three Kings' Day (January 6) without incurring in an event of default due to discontinuance of the Work.

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15.2.2. If one or more of the events identified in Article 15.2.1 occur, Owner may, after giving Contractor (and the surety, if any) seven (7) days written notice to cure such default, terminate the services of Contractor, exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools and appliances at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion), incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and finish the Work as Owner may deem expedient. In such case, Contractor shall not be entitled to receive any further payment until the Work is finished.

15.2.3. In Lump Sum contracts, if the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor.

15.2.4. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Owner's Representative as to their reasonableness and, when so approved by Owner's Representative, incorporated in a Change Order or Extra Work Order. When exercising any rights or remedies under this paragraph Owner shall not be required to obtain the lowest price for the Work performed, but shall assume all reasonable means to complete the work at a reasonable cost.

15.2.5. When Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.

15.2.5.1. Termination of the Contract, as stated above, will not release the Contractor of his responsibilities for the Work completed, nor shall said termination release surety from its obligations.

15.3 Owner May Terminate the Contract For Convenience

15.3.1. Upon seven (7) days written notice to Contractor and Architect/Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, elect to terminate the Contract for convenience.

15.3.2. After receipt of notice of termination for convenience from the Owner, the Contractor shall submit, within sixty (60) calendar days of the effective termination date, a Claim for compensation damages and/or costs. In such Claim, if presented, Contractor shall be paid, without duplication of any items, the following:

15.3.2.1. In lump sum contracts, the work performed and accepted by the Owner shall be paid in accordance with the schedule of values approved by the Owner.

15.3.2.2. The actual cost of all acceptable materials for which orders have been placed by the Contractor for use under this Contract, provided that, if required by the Owner, the Contractor shall make every reasonable effort to cancel such orders. If said orders can be canceled, the Owner shall pay for all restocking, or other charges, associated with said cancellation.

15.3.2.3. The actual cost of acceptable raw material ordered or purchased for fabrication, or materials already fabricated, whether those materials are located in the shop, the project, or in transit.

UNIFORM GENERAL CONDITIONS FOR PUBLIC WORKS CONTRACTS

15.3.2.4. The actual amounts paid by the Contractor for construction equipment rentals up to the time of termination, plus any amounts accrued, or payable, under written contracts for the rental of such equipment. Contractor shall make every possible effort to cancel any such contracts. In the event that the rental contracts can be canceled by the Contractor, the Owner shall pay for all reasonable costs incurred directly caused by the rental cancellation. If the equipment is owned by the Contractor, he will be paid the cost (depreciation) of said equipment.

15.3.2.5. The actual costs disbursed by to the Contractor of bonds, insurance, taxes, and deposits required under the Contract, unless previously paid by Owner.

15.3.2.6. Contractor's overhead and profit in the amount equivalent to fifteen percent (15%) of all payments made under Articles 15.3.2.2 to 15.3.2.5.

15.3.2.7. Contractor shall exert his best effort to mitigate the costs mentioned in Articles 15.3.2.2 to 15.3.2.5.

15.3.2.7.1. From the total sum of all the costs indicated in Articles 15.3.2.2 to 15.3.2.6. there shall be deducted all payments therefore previously made and all proper charges to the Contractor in relation therewith.

15.3.3. In the event that the Work is suspended under Article 15.1, thereby stopped for a period of time, and after said suspension is cancelled, the amounts due to the Contractor under the Contract will be first calculated for the suspension period as per Article 15.1 hereunder and then calculated for the cancellation afterwards as per Article 15.3, hereunder. The total amount due the Contractor will be the sum of both.

15.3.4. If the Contract is terminated for convenience, the Owner shall assume all security, and insurance of the project on the effective date of the termination, or cancellation.

9 15.3.5. Termination of the Contract for convenience, as stated above, will not release Contractor from his responsibilities for the Work completed, nor shall it release his surety of its obligations.

15.3.6. Contractor shall not be entitled to payment on account of loss of anticipated or expected profits or revenues or other economic loss arising out of or resulting from such termination for convenience under this Article 15.3.

15.4 Contractor's Right to Terminate the Contract

15.4.1. The Contractor has the right to Terminate the Contract and recover from the Owner payment for all work executed as specified in Article 15.3.2, herein, if the Owner:

15.4.1.1. substantially stops the work for any reason whatsoever through no act, or fault, of the Contractor for a period of ninety (90) days starting from the written stoppage notice of the Owner and/or the Owner's Representative, or

15.4.1.2. fails to pay the duly approved Request for Payments within eighty (80) calendar days after the same was due.

15.4.2 The foregoing provisions are in addition to, and not in limitation of the rights of the Contractor under any other provisions of the Contract.

ARTICLE 16 - DISPUTE RESOLUTION

16.1 Disputes

16.1.1. In case of any timely Claim, Dispute or other matter involving the interpretation of the Contract Documents, a change in the Contract Sum, and or an Extension of Contract Time, and other matters in question arising out of, or relating to this Contract or the breach thereof, except for Claims which have been waived by the acceptance of final payment, shall be submitted to and decided first by the Owner's Representative as provided in Article 11.5.

16.1.2. If the Dispute submitted to the Owner's Representative as provided for in Article 11.5 is not decided by him within the thirty (30) day period established therein, the Claim shall be deemed rejected.

16.1.3. If the party establishing the Claim is not satisfied with the decision or automatic rejection by the Owner's Representative, the party will have fifteen (15) days to appeal the decision to the Chief of Construction, or equivalent division head, of the Owner.

16.1.4. The Chief of Construction shall have a period of thirty (30) days from the date of receipt of the notice of appeal during which he must render a decision.

16.1.4.1. However, if the Chief of Construction requires additional time to review the Claim, because of the nature or complexity of the Claim or if additional documents and/or information are needed from the Contractor to make a determination, the Chief of Construction shall submit, within five (5) calendar days of receipt of the notice of appeal, a written notice with an estimate of the additional time needed to review said claim and its justification. This additional time, shall not exceed thirty (30) days, unless more time is agreed upon by the parties.

16.1.4.2. If the Chief of Construction does not render a decision within the time allotted, including extensions, then the Claim shall be deemed rejected.

16.1.5. If the Contractor is not satisfied with the decision or automatic rejection by the Chief of Construction, the Claim shall be referred to the Owner and the Contractor. The parties will meet for negotiations within ten (10) working days of the notice of referral of said Claim. If the Dispute has not been resolved within thirty (30) days after said referral (which may be extended by mutual agreement) and subject to any rights to injunctive relief and unless otherwise specifically provided for herein, the parties shall proceed in accordance with Article 16.2.

16.1.6 Contractor shall carry on the Work and adhere to the progress schedule during all Disputes or disagreements with Owner. The Owner will continue making payments under the Contract for Work performed that is not in Dispute.

16.1.7. No Work shall be delayed or postponed pending resolution of any Disputes or disagreement unless Owner and Contractor otherwise agree in writing.

16.2 Remedies

16.2.1. All Disputes not resolved by the method indicated in Article 16.1, upon written agreement of the parties, shall be submitted to non-binding mediation as indicated in Article 16.3. Either party may, at any time, give written notice to the other party that it does not wish to mediate or to continue to mediate a Dispute. Such notice shall conclude the mediation process.

16.2.2. If the parties fail to agree to submit the Dispute to mediation, or one party decides to cancel the mediation after the mediation has started, or if the mediation process does not resolve all Disputed matters, then the remaining Disputes shall be decided by arbitration, upon timely demand for arbitration, notified by one party to the other within ten (10) days after the mediation process has concluded, if the amount of the claim does not exceed the limits established in Article 16.4.1. The mediation process shall conclude on the date notice is delivered by one party to the other stating that the party does not wish to mediate or to continue to mediate. Any undecided Disputes that exceed the limits established in Article 16.4.1, will be decided by the General Court of Justice of Puerto Rico.

16.3 Mediation

16.3.1. If the parties agree to mediate the Dispute they may chose between:

16.3.1.1. a mutually agreed mediation procedure; or

16.3.1.2. a mediation procedure under the supervision of the Bureau of Claim Resolution by Alternate Methods the Office of the General Court of Justice; or

16.3.1.3. a mediation procedure administered by the American Arbitration Association under its Construction Industry Mediation Rules.

16.3.2. All costs incurred as a result of the mediation shall be borne equally by the parties, unless the mediator orders otherwise in accordance to Article 16.3.4.

4 16.3.3. The parties will be required to exchange their positions as to the Dispute, fully and in good faith, with a detailed description of the facts and of the applicable law and shall fully exchange supporting documents. If after agreeing to mediate a Dispute a party is substantially unprepared to participate in the proceedings, or fails to participate in good faith, the Mediator at his discretion may require said party to pay all or part of the costs of the mediation incurred by the other party due to the non-compliance with this Article.

16.4 Arbitration

16.4.1. Disputes to be arbitrated shall be limited to those Disputes, which when all sums claimed therefore under the Contract are added, total an aggregate sum of five percent (5%) or less of the Contract Price or \$500,000.00 or less, whichever is lower. Only such Disputes where the aggregate amount claimed is below said threshold shall be resolved through the arbitration procedures established in this Article 16.4. The aggregate sum shall be determined on the date of the notice of the demand for arbitration taking into consideration all pending Disputes regarding the Contract submitted by the Contractor pursuant to Articles 11.5 and 16. In order to qualify for resolution thru arbitration, all issues and Claims regarding liability and damages relating to a particular Dispute must be submitted together, within the same arbitration proceeding. The parties are specifically prohibited from submitting the issue of liability to arbitration and thereafter submitting the issue of damages (regarding the same Dispute) to another arbitration proceeding or to the court.

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16.4.1.1. The \$500,000.00 threshold will be adjusted every five (5) years. The adjustment will be based on the Consumer Price Index (CPI) published by the Government of Puerto Rico. The base year for such adjustment shall be the year 2010.

16.4.1.2. If Contractor invokes the provisions of this Article 16.4, but at a later date submits additional Claims to the Owner under the same Contract, pursuant to Article 11.5 and/or Article 16, for an additional sum which, if added to the amount claimed under the original Dispute(s), surpasses the threshold amount established in Article 16.4.1, then said additional Disputes that surpass the threshold may not be submitted to arbitration and shall be decided by the General Court of Justice of Puerto Rico. Nevertheless, the already pending arbitration proceedings under Article 16.4 shall continue until concluded. If additional Disputes are submitted after the arbitration proceedings are concluded and final award has been entered, then the amounts of the original Claims that were arbitrated and concluded shall not count towards the threshold stated in Article 16.4.1.

16.4.2. Procedure For Binding Arbitration.

16.4.2.1. Contractor shall submit to the Owner, together with the notice of demand for arbitration of a Dispute, a list of no less than five (5) proposed arbitrators, together with their respective curriculum vitae and a disclosure statement from each as to possible conflicts of interest.

16.4.2.2. Within five (5) working days of receipt of the notice of demand for arbitration, Owner shall either: (i) select one (1) arbitrator from the Contractor's list, or (ii) if all arbitrators proposed by Contractor are unacceptable to Owner, submit to Contractor a list of no less than five (5) proposed arbitrators, together with their respective curriculum vitae and a disclosure statement from each as to possible conflicts of interest.

16.4.2.3. Within five (5) working days of receipt of the Owner's list, contractor shall either: (i) select one (1) arbitrator from such list or (ii) reject all arbitrators from the Owner's list. If within the following ten (10) days the parties cannot agree as to an arbitrator or a panel of arbitrators, then each party within the following five (5) days will unilaterally appoint and notify to the other one arbitrator, and the two (2) arbitrators so appointed shall within ten (10) days after the appointment of both arbitrators select a third arbitrator and notify the Owner and the Contractor of said selection, and the three (3) arbitrators shall constitute the panel of arbitrators that shall decide the Dispute. The arbitrators so appointed or selected need not be on the original lists of arbitrators. Within ten (10) days of the selection of the third arbitrator, each arbitrator shall notify Owner and Contractor their respective curriculum vitae and statement as to possible bias or conflict of interest.

16.4.2.4. The arbitration proceedings shall be conducted under the provisions of the Puerto Rico Arbitration Act, Act No. 376 of May 8, 1951, as amended.

16.4.3. Award

16.4.3.1. The award entered need not include written determinations of fact and conclusions of law and the award shall be final and not be reviewable or appealable due to errors of fact or of law. Nevertheless, the arbitrators will endeavor to ascertain the facts and follow the law.

ARTICLE 17 -MISCELLANEOUS

17.1 **Governing Law.** The Contract Documents, and all questions relating to their validity, performance, interpretation and enforcement, shall be governed by and construed in accordance with the laws of the

UNIFORM GENERAL CONDITIONS FOR PUBLIC WORKS CONTRACTS

Commonwealth of Puerto Rico. Any legal action brought concerning the above shall be brought in accordance with the contract and thereafter exclusively in the courts of the Commonwealth of Puerto Rico.

17.2 Federal Funds

17.2.1. When the United States government or any of its agencies finances or pays for all or any portion of the cost of the Work, federal laws and the applicable rules and regulations must be observed by the Contractor. The Owner will identify in the bid documents the program providing such funds.

17.2.2. If the Contract Documents include a specific provisions issued by such federal funding agency in case of conflict with other provisions of the Contract Documents, said federally issued provisions shall govern.

17.2.3. Unless specified elsewhere in the Contract Documents, the funding federal agency is not a party to this Contract.

17.2.4 When the United States government funds Work covered by the Contract Documents, the Work shall be under the supervision of the Owner but subject to the inspection by the appropriate Federal agency and in accordance with the applicable Federal statutes and rules and regulations.

17.2.4.1. Such inspection shall in no way make the Federal Government a party to this Contract and will in no way interfere with the rights of either party hereunder.

17.2.4.2. The Contractor shall extend the same courtesies to the representatives of the Federal government as required to be extended to representatives of the Commonwealth government.

17.3 Notice

17.3.1. Unless otherwise specified in the Agreement or in the Contract Documents, written notice shall be deemed to have been duly served if delivered:

17.3.1.1. to Contractor if delivered in person to the individual, to a member or partner of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

17.3.1.2. to Owner if delivered in person to the Owner's Representative or to the Project Inspector; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice with the requirements established in Article 17.3.2.

17.3.2. All notices whereby a consent, approval or action is required to be performed by the recipient within a specific period shall include, in bold and capitalized font, at the top of the transmittal communication the following legend: "IMPORTANT RIGHTS MAY BE LOST BY FAILURE OF [NAME OF PARTY] TO ACT PROMPTLY. SPECIFIC ACTION(S) AND/OR APPROVAL(S) ARE HEREIN REQUESTED. IN CASE OF AUTOMATIC APPROVAL DUE TO FAILURE TO ACT BY THE RECIPIENT THE NOTICE MUST STATE: THIS SUBMISSION WILL BE DEEMED APPROVED _____ BUSINESS DAYS AFTER RECEIPT BY [NAME OF PARTY] IF REJECTION IS NOT NOTIFIED TO [NAME OF SENDER]."

17.4 Computation of Time. When a period of time is to be computed for any purposes under the Contract Documents, the number of days within such period will exclude the first and include the last day. If the last day of

UNIFORM GENERAL CONDITIONS FOR PUBLIC WORKS CONTRACTS

any such period falls on a Saturday, a Sunday or on a Holiday listed in Article 1.1.1.41, such day will be excluded from the computation.

17.5 Ownership of Documents. Any reports, information, findings, data, or any other documents prepared or assembled by the Contractor regarding the Contract will be the sole property of the Owner and shall not be made available by Contractor to any individual or organization without the prior written approval of the Owner, unless required by court order.

17.6 Personal Liability of Public Officials. In exercising rights or carrying out duties under the Contract, the Owner's Representative, the Contracting Officer, and their authorized representatives shall not be personally liable, it being understood that they act as the agents and representatives of Owner.

17.7 No Waiver of Legal Rights

17.7.1. In Unit Price Contracts, the Owner shall not be precluded or stopped by any measurement, estimate, or certificate made either before or after the completion and acceptance of the Work (and payment made therefore), from showing the true amount and character of the Work performed and materials furnished by the Contractor, nor from showing that any such measurement, estimate or certificate is untrue or is incorrectly made, nor from showing that the work or materials do not in fact conform to the Contract.

17.7.2. The Owner shall not be precluded or stopped, notwithstanding any such measurement, estimate or certificate and payment in accordance therewith, from recovering from the Contractor or his sureties, or both, such damage as Owner may have sustain by reason of his failure to comply with the terms of the Contract. Neither the acceptance by the Owner or any representative of the Owner nor any payment for or acceptance of the whole or any part of the Work, nor any extension of time, nor any possession taken by the Owner, shall operate as a waiver by Owner of any right hereunder.

17.7.3. A waiver by the Owner, or Contractor, of any breach of the Contract shall not be held to be a waiver as to any other breach.

17.7.4. The Contractor, shall be liable to the Owner for latent defects, fraud, (or such gross mistakes as may amount to fraud), and every contractual warranty or guaranty.

17.8 Cumulative Remedies. The duties and obligations imposed by these General Conditions and the rights and remedies available thereunder are in addition to, and are not to be construed in any way as a limitation of any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents, and the provisions of this Article will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.9 Successors and Assigns. The Owner and the Contractor each binds himself, his partners, successors, assigns and legal representatives to the other party hereto and to the partners, successors, assigns and legal representatives of such other party in respect to all covenants, agreements and obligations contained in the Contract Documents. Neither party to the Contract shall assign the Contract or sublet it as a whole without the written consent of the other, nor shall the Contractor assign any moneys due or to become due to him hereunder, without the previous written consent of the Owner.

17.10 Survival of Obligations. All representations, indemnifications, warranties, and guarantees made in,

UNIFORM GENERAL CONDITIONS FOR PUBLIC WORKS CONTRACTS

required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work and termination or completion of the Agreement.

17.11 Language. These Uniform General Conditions were enacted by the Secretary and approved by the Governor of Puerto Rico in the English language, according to the Legislative authorization found in Law No. 1 of January 28, 1993.

17.12 Amendments. These Uniform General Conditions shall be amended whenever the Secretary deems it necessary in order to fulfill its purpose.

PART C. ADDITIONAL PROVISIONS

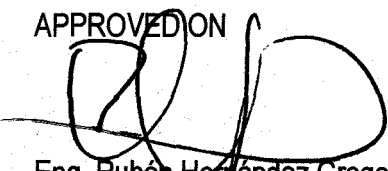
ARTICLE 1: SEPARABILITY CLAUSE; EFFECTIVENESS

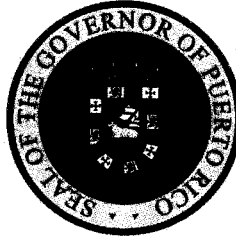
1.1 Separability Clause. If any provision authorized in these regulations is declared unconstitutional or void by a Court of Competent jurisdiction, the remaining provisions of this Uniform General Conditions shall continue in effect.

1.2 Effectiveness. These Uniform General Conditions shall enter into effect thirty (30) days after having been filed and enacted by the Department of State, except with regard to Contracts whose Contract Price is paid by one or more Federal Agency in which case these Uniform General Condition, with regard to such Contracts, shall enter into effect immediately after said Federal Agencies, which provide such funds, consent in writing to their use as part of the Contract Documents. At the time of said effectiveness and from that moment forward, general conditions used and issued by a government agency, department, public corporation and instrumentality, may no longer be validly incorporated in Contracts for public works, with the exception of these Uniform General Conditions.

APPROVED ON

February 22, 2011, IN SAN JUAN, PUERTO RICO.


Eng. Rubén Hernández Gregorat, MEM, PE
Secretary
Department of Transportation and Public Works



GOVERNMENT OF PUERTO RICO

CERTIFICATION

Pursuant to Law No. 198 of May 15, 1943, as amended, and Law No. 1 of January 28, 1993 and after compliance with the Puerto Rico Uniform Administrative Procedure Act, Law No. 170 of August 12, 1988, as amended, I hereby approve the final version of the Uniform General Conditions for Public Contracts of the Government of Puerto Rico, as prepared by the Secretary of Transportation and Public Works and submitted for my consideration on February 22, 2011.

In San Juan, Puerto Rico, this 23rd -day of February of 2011.

A handwritten signature in black ink, appearing to read "Luis G. Fortuño".

Luis G. Fortuño
Governor



OMBUDSMAN

1977

Gobierno de Puerto Rico

OFICINA DEL PROCURADOR DEL CIUDADANO

Hon. Iris Miriam Ruiz Class
Procuradora

8 de febrero de 2011

Hon. Rubén A. Hernández Gregorat
Secretario
Departamento de Transportación y Obras Públicas
PO Box 41269
San Juan, Puerto Rico 00940-1269

Re: **NEG-11-00061**
Proyecto de Condiciones Generales Uniformes para Obras Públicas

Estimado secretario Hernández Gregorat:

La Procuraduría de Pequeños Negocios, luego de analizar y hacer varias recomendaciones para el **Proyecto de Condiciones Generales Uniformes para Obras Públicas**, presentado por el Departamento de Transportación y Obras Públicas, entiende que el mismo no tiene impacto sustancial que pueda afectar a los pequeños negocios.

Por otra parte, le recordamos que el Artículo 5 de la Ley Núm. 454 del 28 de diciembre de 2000, según enmendada, Ley de Flexibilidad Administrativa y Reglamentaria para el Pequeño Negocio (LFAR), impone a las agencias a deber de hacer públicas las copias del Análisis de Flexibilidad Reglamentaria en el Registro de Reglamentos del Departamento de Estado.

La falta de publicación del Análisis de Flexibilidad podría inducir que cualquier asociación de comerciantes y/o dueño de negocio radique en el Tribunal la impugnación del reglamento por no cumplir con los aspectos procesales establecidos en la LFAR. Este tipo de acción judicial requeriría que el pequeño negocio demuestre al Tribunal el impacto negativo que le puedan causar tanto el nuevo reglamento como la falta de un Análisis de Flexibilidad. El término para impugnar el referido reglamento es de un (1) año a partir de la fecha en que el mismo entre en vigor.

Por lo cual, la Procuraduría de Pequeños Negocios da un aval condicionado al reglamento propuesto y exhorta que el nuevo reglamento sea promulgado cumpliendo con todas las disposiciones en ley. Le exhortamos también a comunicarse con nuestra Procuraduría de tener alguna duda al respecto.

Respetuosamente,


Leda Edison Negrón Ocasio
Procurador de Pequeños Negocios

Minillas Station PO Box 41088 San Juan, Puerto Rico 00940-1088

Tel. (787) 724-7373 • Fax (787) 724-7386

irismiriam.ruiz@opc.gobierno.pr

**GOBIERNO DE PUERTO RICO
DEPARTAMENTO DE TRANSPORTACIÓN Y OBRAS PÚBLICAS**

**ANALISIS DE FELIXIBILIDAD ADMINISTRATIVA Y REGLAMENTARIA
PARA PEQUEÑOS NEGOCIOS**

UNIFORM GENERAL CONDITIONS FOR PUBLIC WORKS CONTRACTS

10 DE DICIEMBRE DE 2010

ANÁLISIS SOBRE FLEXIBILIDAD ADMINISTRATIVA Y
REGLAMENTARIA PARA PEQUEÑOS NEGOCIOS

UNIFORM GENERAL CONDITIONS FOR PUBLIC WORKS

I. BASE LEGAL, NECESIDAD Y OBJETIVOS DEL REGLAMENTO PROPUESTO

A. Base legal y necesidad de adoptar reglamentación

La Ley Núm. 198 del 15 de mayo de 1943, según enmendada, 22 L.P.R.A. §59, et seq., autorizó y ordenó al Secretario de Transportación y Obras Públicas preparar un pliego de condiciones generales para la contratación de obras públicas en Puerto Rico. Mediante esta Ley se creó el marco jurídico aplicable a la contratación de toda obra pública y se estableció un procedimiento para su promulgación.

Habiendo transcurrido ya varios años desde la aprobación del último pliego de condiciones generales, el Departamento de Transportación y Obras Públicas (DTOP) y la Autoridad de Acueductos y Alcantarillados (AAA), con el insumo y cooperación del Asociación de Contratistas Generales (AGC), Capítulo de Puerto Rico, se dieron a la tarea de confeccionar un nuevo pliego de condiciones generales mediante el cual se pretendió cobijar uniformemente a todas las agencias gubernamentales que realizan obra pública, además de crear unas nuevas reglas que se atemperaran a la experiencia adquirida colectivamente por las distintas agencias gubernamentales a través de años de contratación.

Para canalizar el proceso y poder alcanzar las metas resultó indispensable enmendar la referida Ley Núm. 198. A estos efectos se preparó un ante proyecto de Ley el cual luego de ser evaluado por distintas Comisiones (Comisión de Gobierno, Urbanismo e Infraestructura) y aprobado por el Senado y la Cámara de Representantes, fue aprobado por el Gobernador, convirtiéndose en la Ley Núm. 131 del 2 de septiembre de 2010.

Las enmiendas que trajo la referida Ley 131 fueron, en esencia, las siguientes:

- (a) la actualización de conceptos contenidos en la Ley 198 para conformarlos a la realidad jurídica actual;
- (b) la inclusión de disposiciones específicas para establecer que el Pliego de Condiciones Generales Uniformes regiría las relaciones contractuales en la construcción de toda obra pública que realicen las agencias, departamentos, corporaciones públicas y demás instrumentalidades gubernamentales con excepción de los Municipios; y
- (c) disponer que el proceso de aprobación de las condiciones generales uniformes se haría de conformidad con las disposiciones de la Ley de Procedimiento Administrativo Uniforme, Ley Núm. 170 de 12 de agosto de 1988, según enmendada.

Las enmiendas realizadas a la Ley 198 sentaron las bases legales que permiten la aprobación de este pliego de Condiciones Generales Uniformes.

La contratación, coordinación y supervisión de obras públicas presenta problemas y situaciones de carácter recurrentes tanto para las agencias como para los contratistas. Para atender estos problemas era necesaria la creación y aprobación de un conjunto de disposiciones que especificaran cuales son las responsabilidades, obligaciones y poderes de cada una de las partes contratantes y sus competencias en los campos de actuación respectivos.

B. Propósito del reglamento

El Pliego de Condiciones Generales Uniformes pretende uniformar la contratación y administración de toda la obra de construcción pública en Puerto Rico y eliminar el desfase que existe en la contratación en las diferentes agencias. Por ser el resultado de un esfuerzo común y de la experiencia de las partes contratantes, el nuevo pliego de Condiciones Generales Uniformes busca proveer soluciones o avenidas de acción a problemas contractuales, administrativos y legales comunes o similares y sirve de instrumento para nivelar el terreno para todas las partes de manera que se protejan adecuadamente los intereses de cada uno de los contratantes.

II. APLICABILIDAD

Las disposiciones contenidas en el Pliego de Condiciones Generales Uniformes son de aplicación a cualquier persona natural o jurídica que suscriba un contrato con cualquier agencia de gobierno, departamento, corporación pública o cualquier instrumentalidad del Gobierno de Puerto Rico en el cual el objeto del contrato sea la consecución de obra pública. Sin embargo, las Condiciones Generales Uniformes no sólo son de aplicación al contratista principal de la obra que contrata con una agencia sino que existen clausulas que son aplicables a los subcontratistas y materialistas que trabajan en dicha Obra. El trabajo que un subcontratista o suplidor realice para el contratista general del Proyecto deberá ser de conformidad a un acuerdo en el que se le obligue al Subcontratista a cumplir con los términos y condiciones de seguridad, y otros de las Condiciones Generales y de los Documentos Contractuales que le sean aplicables.

III. POSIBLES IMPACTOS DE LA REGLAMENTACIÓN

A. Pequeños negocios impactados

Este Reglamento tiene un impacto en toda entidad que contrate para la ejecución de una obra pública sin importar el tamaño que tenga esa operación comercial. El factor determinante no es el tamaño del negocio sino el objeto del contrato, o sea que el contrato conlleve la ejecución de una obra pública incluyendo pero sin limitarse a trabajos de construcción, restauración y reparación de edificios o construcciones existentes o nuevas, así como la conservación y mantenimiento de los elementos construidos y los proveedores de diferentes servicios contratados para trabajar en Obras.

Para que un contratista principal pueda hacer negocios con el Gobierno Federal de Los Estados Unidos y con el Gobierno de Puerto Rico este debe estar inscrito en el Registro Único de Licitadores. Este requisito no es de aplicación a los sub-contratistas y materialistas del contratista principal del Proyecto ya que la relación contractual de los materialistas o subcontratistas no es con el gobierno o la agencia, sino que su relación contractual es con el Contratista Principal. El Registro de Licitadores o proveedores le brinda la oportunidad legítima a las corporaciones o entidades de participar del proceso de compra gubernamental "procurement" y la participación de las subastas como contratista principal. En Puerto Rico existen varios

registros de licitadores o proveedores siendo el más importante el Registro Único de Licitadores que es dirigido por la Administración de Servicios Generales (ASG). Este Registro es respaldado por la Ley 85 de Junio 2002, mejor conocida como "Ley Registro Único de Licitadores". Uno de los propósitos principales de este Registro es que el Gobierno puede asegurarse de lo siguiente: Adquirir bienes y servicios de empresas que cumplan con todas las requisiciones fiscales; Contratar empresas bonafides debidamente autorizadas para hacer negocios en Puerto Rico; Contratar Individuos que estén al día en sus obligaciones fiscales; Contratar individuos y empresas que cumplan con solvencia ética y moral; Contratar empresas que puedan cumplir con los bienes o servicios solicitados.

Muchos de los contratistas registrados en el Registro Único de Licitadores no cualifican como pequeños negocios ya que emplean a más de quince (15) personas, por tanto estos contratistas, aunque están impactados por el Reglamento de Condiciones Generales Uniformes, no están dentro del marco de los negocios cubiertos por este análisis. No empecé lo anterior, existen algunos contratistas que sí cualifican como pequeños negocios, estos contratistas en su mayoría son corporaciones dedicadas a proyectos de construcción que envuelven construcción de carreteras, puentes edificios y otros. Por otro lado, los subcontratistas y materialistas de los proyectos de construcción de obra pública si son usualmente pequeños negocios, sin embargo, a estos no les aplica el requisito de pertenecer al Registro Único de Licitadores pues su relación contractual no es con el gobierno o la agencia sino con el contratista general de la obra.

A pesar de no requerir que el sub contratista pertenezca al registro único de licitadores las Condiciones Generales Uniformes si establecen que el dueño podrá objetar la contratación de un subcontratista o materialista si existen razones validas. Las Condiciones Generales Uniformes le requieren al Contratista Principal de la obra presentarle al gobierno o agencia con la cual contrata un listado en el que se detallen el nombre de los subcontratistas y materialistas principales que pretende utilizar en las porciones principales del Proyecto. Por su parte la agencia o gobierno tiene el deber de investigar y notificar al Contratista si objeta alguno de los subcontratistas o suplidores contenidos en la lista provista por el contratista principal. La objeción por parte de la agencia no podrá ser arbitraria, la misma deberá ser una razonable y los fundamentos para la misma deberán constar por escrito. Las causas para objetar a un subcontratista, suplidor o materialista pueden incluir, entre otras: record de incumplimientos previos de un subcontratista o materialista con la agencia, record flagrante de violaciones de seguridad o desempeño insatisfactorio en pasados Proyectos con la agencia. Este procedimiento tiene el propósito de garantizar algún control sobre los contratistas o suplidores de Proyectos de manera que se evite que subcontratistas o materialistas ineficientes y de alto riesgo trabajen en la obra retrasándola y aumentando los costos los cual al fin y al cabo termina siendo pagado con fondos públicos. Por ende, esta es una medida de control que pretende asistir a la mejor utilización de fondos públicos.

B. Impacto económico al pequeño negocio

Las Condiciones Generales Uniformes son el resultado de un esfuerzo interagencial dirigido por el DTOP y la AAA, agencias que por su vasta experiencia en la contratación de obras públicas tomaron la iniciativa de crear un conjunto de disposiciones que regularan y uniformaran la contratación de Obra. Durante la redacción de las Condiciones Generales Uniformes se contó con la participación y colaboración activa de la ACG, Capítulo de Puerto Rico. La ACG es una asociación que agrupa a más de 350 compañías que generan un 80% de la construcción en nuestra Isla. Entre los propósitos y objetivos de la ACG se encuentra el combatir las prácticas injustas, apoyar al contratista y sus asociaciones para verificar condiciones insatisfactorias y estimular métodos de contratación que no expongan al contratista a riesgos.

El proceso de redacción de las Condiciones Generales Uniformes incluyó la celebración de innumerables reuniones para la discusión de las disposiciones. En dichas reuniones las partes presentaban sus posiciones en cuanto a cada disposición. Por ende el borrador que resultó del ejercicio contó con la aprobación del ACG. Debido a que la participación de la ACG en este proceso fue esencial para la redacción de las Condiciones Generales Uniformes, los derechos de los contratistas al igual que impacto económico de estas condiciones generales fueron escuchados para que dicho impacto a los contratistas fuera mínimo.

No obstante, por tratarse de fondos públicos que van a ser desembolsados para la construcción de obras públicas, el Gobierno tiene que tener unas garantías de que dicho dinero será invertido de manera eficiente. Por tal razón siempre que la agencia suscribe un contrato con un contratista general para construcción de obra pública a este se le requiere la prestación de ciertas fianzas y seguros que garanticen que los fondos resultaran en la construcción de la obra. Las Condiciones Generales Uniformes también exigen la prestación de estas garantías, sin embargo, las mismas fueron redactadas para nivelar el campo del juego y salvaguardar los derechos de todas las partes envueltas.

C. Zonas geográficas de mayor impacto

Las disposiciones de las Condiciones Generales Uniformes impactan directamente a los contratistas principales que contratan con el gobierno o agencia. Estos contratistas, los cuales tienen que ser licitadores autorizados, se encuentran ubicados a través de todo Puerto Rico. Las estadísticas de la ASG demuestran que la mayoría de los licitadores autorizados se encuentran ubicados en la zona metropolitana. Sin embargo, como mencionamos anteriormente la mayoría aunque no todos estos contratistas principales no se consideran pequeños negocios. La mayoría de los pequeños negocios que están en alguna manera impactados por la Condiciones Generales son los subcontratistas, suplidores o materialistas los cuales se encuentran distribuidos por toda la Isla aunque en su mayoría también están ubicados en el área metropolitana.

IV. CUMPLIMIENTO CON EL REGLAMENTO

A. Personal que fiscalizará su cumplimiento

El personal encargado de hacer cumplir las disposiciones Condiciones Generales Uniformes consiste de los funcionarios de las agencias o instrumentalidades de gobierno contratantes que están a cargo de la contratación, supervisión y sobreseimiento de la construcción de la obra.

B. Sanciones y penalidades

El incumplimiento con las disposiciones del Reglamento de Condiciones Generales Uniformes puede conllevar la imposición de daños líquidos, cancelación de contratos, radicación de demanda por incumplimiento, imposición de multas y cancelación de autorizaciones o licencias.

Las Condiciones Generales Uniformes disponen que en caso de que el contratista o su aseguradora no completen el trabajo dentro del tiempo especificado por el contrato o según extendido se le impondrá al contratista una suma de daños líquidos por cada día calendario que el trabajo no sea completado en tiempo. Los daños líquidos fluctúan desde \$300.00 dólares diarios en Contratos de \$0 hasta \$99,999.99 hasta \$8,000.00 diarios en proyectos de \$50 Millones en adelante (aunque esto puede variar según la

Provisión Especial que se incluya en el contrato. Por otro lado, las Condiciones Generales Uniformes también disponen de un incentivo equivalente a la mitad de los daños líquidos estipulados por cada día que la obra este sustancialmente completada antes de la fecha de terminación estipulada en el Contrato.

Lo anterior no impide que el Gobierno de Puerto Rico pueda, por los mismos hechos, iniciar un procedimiento criminal contra cualquier contratista que se identifique que ha cometido delitos relacionados con fraude en la construcción o cualquier otro delito tipificado en el Código Penal de Puerto Rico.

C. Otros requisitos para cumplimiento

Las Condiciones Generales Uniformes son un conjunto de disposiciones que definen los deberes y derechos del contratista principal y de las agencias en el proceso de contratación y construcción de obras públicas. Estas Condiciones Generales Uniformes también disponen los términos para actuar o presentar reclamaciones. Debido a su carácter regulador las Condiciones Generales Uniformes establecen múltiples requisitos a los contratistas a quienes se les adjudica la construcción de una obra pública y discutirlos todos sería vertir el contenido de las condiciones generales en este escrito. Sin embargo, entendemos que los requisitos más significativos en cuanto al impacto económico del Reglamento en aquellos pocos contratistas principales que cualifican como pequeños comerciantes es el asunto de la obtención de las fianzas y pólizas de seguros requeridas en el Artículo 3 de las Condiciones Generales Uniformes.

La Condiciones Generales Uniformes disponen que el contratista principal que haya recibido la buena pro en una subasta y contraté con el gobierno o agencia para la construcción de una obra pública no podrá comenzar trabajos hasta no haber obtenido ciertas pólizas de seguros y fianzas requeridas en las Condiciones Generales Uniformes. En el caso de las agencias que no tienen un "Owner's Controlled Insurance Program" el contratista principal de la obra deberá, dentro de los diez (10) días de haber recibido la notificación de adjudicación de subasta, proveer lo siguiente: (1) fianza de pago y fianza de cumplimiento en una suma de al menos 50% hasta 100% del monto del contrato; (3) pólizas del Fondo de Seguro de Estado y todas las pólizas de seguros social y laborales necesarias; (4) seguro de responsabilidad general; (5) póliza choferil para negocios; (6) builders risk; (7) instalation floater policy; (8) "contractors liability insurance" con un límite agregado general de \$1 Millón, límite agregado de productos o operación de \$1,000.00, límite de "advertising and injury", límite por ocurrencia de \$5,000,000.00 límite de daños por fuego \$50,000.00 límite de gastos médicos de \$5,000.00. Estos requisitos son aplicables al contratista general porque su relación contractual es con la agencia pero no al subcontratista o suplidor ya que relación contractual es con el contratista general. A pesar de lo antes expresado al subcontratista le aplican algunas clausulas de las condiciones generales sobre calidad de trabajo, seguridad y otros relacionados al trabajos que contrate.

Otro requisito de impacto económico para aquellos contratistas generales que sean pequeños negocios es que el contratista general vendrá obligado al pago de todos los impuestos incluyendo impuesto de ventas, consumo, uso y otros de carácter similar necesarios para la consecución de de la Obra. Estos impuestos deben pagarse de acuerdo con las leyes, reglamentos y ordenanzas del lugar donde ubique la Obra que sean aplicables durante el periodo en de duración de la Obra y que estuvieran en efecto al momento de la subasta. Estos impuestos incluyen los impuestos municipales. Véase Art. 6.10.

Las pólizas de seguros y fianzas así como los impuestos y otros costos son gastos que el contratista general toma en consideración al momento de someter su propuesta ante la agencia o sea al momento de

licitar. Por tanto, estos gastos se encuentran absorbidos en el precio de licitación que el contratista general somete, a saber, en el Precio del Contrato. Los requisitos para las diferentes fianzas y seguros tienen el propósito de garantizarle a la agencia que el contratista principal será responsable. Estas disposiciones garantizan la ejecución de la obra y la mejor utilización de los fondos públicos que se desembolsan para pagar la Obra.

Por otro lado el impacto que tiene el Reglamento de Condiciones Generales Uniformes en los subcontratistas, materialistas y suplidores no es un impacto de carácter económico sino un impacto de carácter regulatorio ya que algunas disposiciones de las Condiciones Generales Uniformes como las de seguridad y otras que no son las de fianzas se incorporaran a los contratos que estos suscriben con el contratista general.

V. RELACIÓN CON OTROS REGLAMENTOS

Este Reglamento guarda relación con todos los reglamentos relacionados a las subastas, compras y contrataciones en obras de gobierno y con la ley y reglamentación de agencias federales que proveen subsidio a varias obras, este Reglamento deberá contar con la anuencia de esas agencias federales. Por tal razón las agencias que reciben ayuda federal notificarán el reglamento a las agencias federales concernidas y obtendrán su posición en cuanto al mismo.

VI. SEÑALAMIENTOS DEL PROCURADOR DE PEQUEÑOS NEGOCIOS

Los representantes del Departamento de Transportación y Obras Publicas se reunieron con el Procurador de Pequeños Negocios y el personal que analizó las disposiciones del propuesto Reglamento con el propósito de recibir el insumo y recomendación del Procurador y discutir y aclarar dudas sobre las clausulas del Reglamento. Las partes discutimos la sección 3.2.1. y 3.2.2 del propuesto Reglamento. Estas Clausulas en esencia requieren (i) que el contratista principal provea lo siguiente antes de dar comienzo a la obra: (1) fianza de cumplimiento; (2) fianza de pago; (3) póliza de compensación a trabajadores; (4) Fondo de Seguro de Estado y seguro social; (5) Seguro de Responsabilidad General; (6) Póliza de Chóferil; (7) Builders Risk; (8) Installation Floater (cuando sea aplicable); y (ii) que el contratista le conceda a las agencias y al gobierno discreción para eximir o solicitar pólizas o seguros de otra naturaleza a las antes mencionadas, según lo entienda necesario. Luego de analizar las disposiciones del Reglamento sobre este particular y atender las preocupaciones determinamos que la discreción que el Reglamento le concede a la agencia es razonable y necesaria. La clausula que permite se exima de algunas pólizas o seguros o que se requieran pólizas o seguros adicionales (sección 3.2.2) ya había sido previamente considerada y discutida el AGC. Precisamente con el propósito de atender la preocupación de posibles decisiones arbitrarias por parte de las agencias en cuanto a eximir o requerir más seguros se creó la Sección 3.2.2.1. Dicha sección obliga a la agencia a exponer por escrito y hacer formar parte del expediente del Proyecto las razones para no solicitar ciertas pólizas o para solicitar pólizas de diferente naturaleza. El propósito de la clausula 3.2.2 es darle cierto grado de flexibilidad al gobierno y agencias que construyen obras públicas para atender casos que ameriten que en bienestar de la consecución de la obra o para la protección de los fondos públicos haya que hacer modificaciones en las pólizas requeridas o en la naturaleza de las mismas. La flexibilidad que provee esta sección es necesaria toda vez que los proyectos de construcción de obra pública varían en complejidad y naturaleza. A pesar de que en general las pólizas requeridas son las mencionadas en la clausula 3.2.1 existen Proyectos que por su alto riesgo, peligrosidad o tecnicismo pueden requerir una modificación en el tipo de póliza. También existen Proyectos de Obra Pública tan sencillos que solicitar todas las pólizas nombradas en la clausula 3.2.1

resultaría innecesario y oneroso para el contratista lo cual haría la obra más costosa para el gobierno o la agencia. La construcción de obra pública requiere la flexibilidad de pólizas que se ajusten a la obra que se construye. El Reglamento pretende que no se haga más costosa una obra sencilla o que se que al descubierto una obra altamente compleja solo por la rigurosidad de una clausula. En fin el propósito es proteger y asegurar los fondos públicos y lograr la construcción de obras de manera rápida y eficaz pero segura. No empee lo anterior, el propio reglamento limita la flexibilidad de la agencia al tomar esta determinación requiriéndole que si se modifican las pólizas solicitadas en la seccion3.2.1.1 para eximir o aumentar de alguna póliza la agencia presente su justificación por escrito y haga que la misma obre en el expediente.

La segunda recomendación del Procurador de Pequeños Negocios se refiere al grado de control que la agencia o entidad gubernamental contratante tiene sobre la elección de los suplidores, materialistas y/o subcontratistas que se contrataran para el Proyecto. Para atender esta recomendación revisamos las disposiciones de la sección 6.21 del Reglamento y sus subincisos. De la sección antes mencionada surge que el Contratista general del Proyecto u Obra es quien determina cuales serán los subcontratistas, suplidores y materialistas que trabajaran en la Obra. En esa determinación inicial de quienes serán los que trabajaran la agencia no tiene ninguna intervención. Una vez el contratista principal hace su selección, entonces el Reglamento le requiere notificarle a la Agencia un listado de los subcontratistas y suplidores principales que el contratista ha escogido para las porciones principales del Proyecto. Nótese que solo se requieren los subcontratistas y suplidores principales de porciones principales del Proyecto o sea que el contratista no tiene que notificar a la agencia todos los subcontratistas sino solo los principales. La agencia hará una investigación y de tener una objeción justificada y razonable a los suplidores o subcontratistas principales que se le notificaron, entonces, lo expresará por escrito y ese subcontratista no podrá ser contratado para la Obra. Entre las razones que la agencia puede levantar para objetar la contratación de un subcontratista o suplidor se encuentra: (1) que el subcontratista haya incurrido en incumplimientos previos con la agencia; (2) que haya tenido record de violaciones de seguridad; o (3) que tenga historial de desempeño deficiente en sus funciones. Las razones que la agencia exprese para objetar tienen que ser razonables no pueden ser arbitrarias, injustas o ilegales. Esta clausula va dirigida a velar porque se logre la construcción rápida y eficiente de obras y sin exponer a la agencia o gobierno a riesgos innecesarios por subcontratistas riesgosos e ineficientes. Las objeciones de la agencia deberán estar fundamentadas en una investigación y constar por escrito y formar parte del expediente de modo que los derechos de un subcontratista o suplidor que quiera impugnar esta decisión pueda llevar la acción que en derecho estime. Por tanto, de lo anterior surge que la agencia no escoge los subcontratistas o materialistas de un Proyecto sino que si luego de una investigación surge que alguno de los que el contratista general pretende utilizar tiene un historial que puede afectar la obra, la agencia puede rechazarlo por el bienestar de la obra y la protección de los fondos.

VII. CONCLUSION

Luego de este análisis, se puede concluir que el reglamento de las Condiciones Generales Uniformes no tendrá un impacto económico adverso en los pequeños negocios que contraten con las diferentes agencias gubernamentales o corporaciones públicas para la construcción de obras públicas.

Attachment 2

ADDITIONAL PROVISIONS

ADDITIONAL PROVISIONS

1. The proposal must include the payment of all applicable state and municipal taxes and patents as require by Law. The Contractor shall be paid taxes prior to start the works and will be required to present evidence of these payments.
2. Along the duration of contract, Contractor must comply with Federal Non-Discrimination policy and Drug-Free Workplace Policy.
3. Any waste generated as part of the contract must be disposed outside of PRNG facilities and in accordance with applicable laws and regulations.
4. The Contractor is responsible for provide to PRNG copy permits hauling vehicle that transport material generated as part of the proposed activities.
5. If applicable the Fuel Oil and Gas (F.O.G.) shall be no more than 25% of the equipment charges.
6. If applicable the Fringe Benefits shall be no more than 30% of the payroll.
7. Working hours at the facility are Monday to Friday from 7:30a.m. to 4:00p.m. Any activities to be developed off working hours must be coordinated with PRNG and the execution will be pending approval from PRNG and without additional charges.
8. All the provide information as part of this acquisition process, including but not limited to: drawings, technical specifications, plans, reports, and photography, is for the exclusive use of this acquisition process. Any reproduction and distribution of the material for other use is prohibit.
9. FAR 52.219-14 Limitations on Subcontracting only apply for contracts performed by Small Business Administration or 8(a) Bidders.
10. Portable Toilet Facilities: Contractor shall be responsible for providing sanitary services for its employees throughout the duration of the activities of the contract. Toilets shall be regularly cleaned and emptied as required by Health regulations.
11. Any person who as part of the activities of the contract, will access the facilities on behalf of the Contractor should be have at all times a photo ID. Accepted identifications are: passport, driver's license, or ID card issued by the Department of Transportation and Public Works (DTOP).
12. As part of the evaluation process of bid proposals personnel of ASG or PRNG verify the amount of the Bid Bond with Surety Company.
13. As-built plans shall be required for the final closeout documents.
14. Article 9.1.4 of Uniform General Conditions for Public Works Contract does not apply.
15. Article 9.6 of Uniform General Conditions for Public Works Contract does not apply.
16. The amount retainage with respect of each progress payment is ten percent (10%).
17. Article 13.2.2.1.1.1 of Uniform General Conditions for Public Works Contract does not apply.
18. Article 13.2.2.1.2 of Uniform General Conditions for Public Works Contract does not apply.
19. During construction works the Contractor cannot close the main street and personnel or vehicle transit cannot be interrupt at any time during the development of the works.
20. PRNG's representative and inspection's representative should have access to the job site at all times.
21. The Contractor is responsible of the project Quality Control. The Quality Control Manager is required by the PRNG. The Quality Control Manager and their personnel will not have an other function and roles in the project.
22. The Project Schedule shall be updated monthly and submitted.

23. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility and utilities services in site.
24. The Contractor is responsible to obtain all permits and certifications of approval required in connection with this statement of works, and requires to develop the activities of the SOW.
25. The Contractor is responsible to keep clean the site works at all times and the removal of debris during performance of the Work.
26. The Contractor shall keep the grass in the project site.
27. If the Contractor fails to clean up and keep the grass, as indicated above, the Owner may do so and the cost thereof shall be charged to the Contractor.
28. All materials and equipment acquired by the Contractor as part of the contract must meet with the Build American Buy American (BABA).
29. The Contractor is responsible for the collection and disposal of all waste generated as part of the activities under contract.
30. Bidders are responsible of notifying to ASG and PRNG any discrepancy that exists in the plans, specifications, and bidding documents during the bidding process.
31. The Contractor is responsible of the quality of all materials and workmanship furnished in the construction of the project and is included in the bid price and no additional payment will be made by PRNG.
32. The Contractor will be allowed to store materials and equipment used in the project within the facility. It is the Contractor's responsibility to provide the storage, security materials, and equipment.
33. The Contractor shall include in their proposal the costs for the tests, analysis, exploration, reports, and results need to perform the SOW and be indicated in the plans, drawings, and specifications.
34. All cost in connection with the preparation and maintenance of schedules, work plans, submittals, request for information, and other work and task have to be included and be part of the project's general administrative expenses.
35. The Contractor is responsible for preparation and implementation of a recycling plan in accordance with Act. No. 70 of September 18, 1992 (Law to reduce and recycle solid waste, as amended) and the Regulations for the reduction, reuse, and recycling of solid waste (Regulation No. 6825, as amended), and lie in the Solid Waste Authority (ADS) Recycling Plan and monthly reports.
36. The Contractor shall submit two (2) sample of each item, when applied.
37. The Contractor will be responsible for submitting a "Site Safety & Health Plan" for approval by the staff of the PRNG, according to the date scheduled. Mobilization to the site cannot be made until the plan is approved.
38. It is the responsibility of the Contractor to assign a "Safety Manager" must have credentials issued by OSHA to perform the Safety Manager roles and responsibility. The Safety Manager will not have an other function and roles in the project.
39. It is up to PRNG's discretion to approved and recognize payment shall be made to the Contractor for material and equipment on site.
40. Perimeter fence details shall comply with approved Plan CES specifications. Project limit fence shall be 4' silt fence and 3.5' HDPE Orange plastic mesh safety fence barrier, reinforced with 2 "x 4" wood stakes.
41. PRNG requires the Contractor to use a software or platform for Construction and Project Management.
42. PRNG requires the Contractor provides a Project Manager at all times in the site project.

43. The Contactor shall be responsible for providing hand wash station for its employees throughout the duration of the activities of the contract.
44. During demolition, construction, and development of the works the daily operation performed in the PRNG's facilities cannot be interrupted at any time during the development of the work.
45. Installation Floater Policy apply for this project.
46. Terrorism Coverage and Terrorism Risk is required.
47. The Contractor is responsible to provide monthly report about the amount and types of debris generated as part of the development of works and activities.
48. The Contractor must report to the PRDNER the corresponding waste generated by the activities of earthwork, demolition activities, and construction activities. Copy of "manifestos" thereof must be delivered to the CFMO.
49. The Contractor must within five (5) calendar days from signed of the contract to provide to PRNG the insurances, policies, and coverage required.
50. The Contractor is responsible for the preparation and establishment of the "Permiso Unico Incidenta" (PUI); including the preparation of the documents required by the OGPe for filling of permits.
51. Construction Permit and Demolition Permit doesn't apply for this project.
52. The Contractor shall submit one (1) original and two (2) hard copies of the submittal. All submittals shall be identified.
53. The Contractor shall prepare and submit all schedules and schedules analysis reports in digital form as well as hard copies.
54. Davis Bacon Act apply for this project.

Attachment 3

CONTRACT FEDERAL CLAUSES



Contract Clauses Required in Purchases and Contracts with Federal Funds **“Cláusulas Contractuales Requeridas en Compras y Contratos con Fondos Federales”** **(2 C.F.R. PART 200, Appendix II)**

Any acquisition to be paid with partial or completely federal funds must comply with all the terms and conditions included as part of this quote request. Any supplier interested in participating in this process agrees to comply with each of the terms and conditions set forth herein. The Contractor certifies that follows the requirements established by state laws and regulations and federal regulations established in 2 CFR §200.

“Cualquier adquisición a ser pagada con fondos parciales o completamente federales, debe cumplir con todos los términos y condiciones incluidos como parte de esta solicitud de cotización. Cualquier proveedor interesado en participar en este proceso, se compromete a cumplir con cada uno de los términos y condiciones aquí establecidos. El Contratista certifica que cumplirá con los requisitos establecidos por las leyes y reglamentos estatales y los reglamentos federales establecidos en 2 CFR §200.”

1. **Record retention and access to records** The Contractor and the Agency shall afford any authorized representative of NGB, DoD or the Comptroller General of the United States access to and the right to examine all records, books, papers, and documents that are parts of this contract. The Agency and the contractor agree to comply with the record retention and provide, as is required, all intact records for at least ten (10) years following closeout of the award.

“El Contratista y la Agencia otorgarán a cualquier representante autorizado de NGB, DoD o el Contralor General de los Estados Unidos acceso y el derecho de examinar todos los registros, libros y documentos que forman parte de este contrato. La Agencia y el contratista acuerdan cumplir con la retención de registros y proporcionar, si es necesario, todos los registros intactos durante al menos diez (10) años después del cierre de la adjudicación.”

2. **Clean Air Act, Water Pollution Control Act (APLICA A CONSTRUCCION DE \$150,000 O MÁS)** The Contractor and the Agency agrees to comply with all applicable standards, order or regulations issued pursuant to the Clean Air Act and the Federal Water Pollution Control Act (42 U.S.C., Section 7401 t 7671 and 33 U.S.C. Section 1318) violations should be reported to NGB and Environmental Protection Agency (EPA).

“El Contratista y la Agencia acuerdan cumplir con todas las normas, órdenes o regulaciones aplicables emitidas de conformidad con la Ley de Aire Limpio y la Ley Federal de Control de la Contaminación del Agua (42 USC, Sección 7401 t 7671 y 33 USC Sección 1318), las violaciones deben informarse a NGB y Agencia de Protección Ambiental (EPA).”

3. **Use of US Flags Carriers** The Contractor agrees to use US Flag Air Carriers for international air transportation of people and property to the extent that such service is available, in accordance with the International Air Transportation Fair Competitive Practices Act of 1974 (49 U.S.C. 40118), and their intraoperative guideline by the Comptroller General of the United States.

“El Contratista acuerda utilizar US Flag Air Carriers para el transporte aéreo internacional de personas y propiedades en la medida en que dicho servicio esté disponible, de conformidad con la Ley de Prácticas Competitivas de la Feria Internacional de Transporte Aéreo de 1974 (49 USC 40118), y su directriz intraoperatoria por El Contralor General de los Estados Unidos.”



4. **Debarment and Suspension: EXECUTIVE ORDERS 12549 and 12689 (APLICA A CONSTRUCCION DE \$100,000 o más)** The Contractor agrees to comply with 2CFR Part 180 by certifying that neither it, subcontractor nor its principals or its affiliates are excluded or disqualified from the Excluded Parties List System (EPLS) or the System for Awards Management (SAM), at the current OMB website. This certification is a material representation of the fact upon which the agency relies in entering this contract. The Contractor will include a provision requiring such compliance in its lower tier transactions. This verification shall be documented on the Contract File and shall be subject to audit (31 U.S.C. 1352). The Contractor and or bidder will provide the required certification as part of the bid and the contract.
“El Contratista acuerda cumplir con 2CFR Parte 180 al certificar que ni él, el subcontratista ni sus directores o sus afiliados están excluidos o descalificados en el Sistema de Lista de Partes (EPLS) excluidas o el Sistema de Gestión de Premios (SAM), en el sitio web actual de OMB. Esta certificación es una representación material de hecho en la cual la agencia se basa para firmar este contrato. El contratista incluirá una disposición que requiera dicho cumplimiento en sus transacciones de nivel inferior. Esta verificación se documentará en el archivo del contrato y estará sujeta a auditoría (31 U.S.C.1352). El Contratista y/o el oferente proporcionarán la certificación requerida como parte de la oferta y el contrato.”
5. **Byrd Anti-lobbying amendment (APLICA A CONSTRUCCION- DESDE EL BID, REQUIERE CERTIFICACION; APLICA \$100,000 o más)**. The Contractor certifies that each tier to the tier above will not and has not used Federal appropriated funds to pay any organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, or an officer of Congress, or an employee of a member of Congress in connection with obtaining any federal contract, grant, or any other awards covered by federal actions.
“El Contratista certifica que cada nivel del nivel anterior no utilizará ni ha utilizado los fondos federales apropiados para pagar a ninguna organización por influir o intentar influir un funcionario o empleado de cualquier agencia, un miembro del Congreso o un funcionario del Congreso, o un empleado de un miembro del Congreso en relación con la obtención de cualquier contrato federal, subvención o cualquier otro premio cubierto por acciones federales.”
6. **Buy American Act** The Contractor agrees to comply with the Buy American Act (41 U.S.C. 10a et seq.) giving preference to domestic end products and domestic construction material.
“El Contratista acepta cumplir con la Ley de Compras de Estados Unidos (41 U.S.C. 10a et seq.) Dando preferencia a los productos finales nacionales y al material de construcción nacional.”
7. **Central Contractor Registration** The parties agree to comply with the System for Award Management (SAM) and Data Universal Numbering System (DUNS) Requirements.
“Las partes acuerdan cumplir con el System for Award Management (SAM) y Data Universal Numbering Requirements (DUNS).”
8. **False or Fraudulent Statement of Claims** The Contractor acknowledges that 31 U.S.C. Chapter 38, applies to its actions pertaining to this contract. The Contractor certifies or affirms the truthfulness and accuracy of any statement it has made, it makes, it may make, or causes to be made, pertaining to this contract. The Contractor agrees to include the above language in each subcontract under this contract, modified only to identify the subcontractor that will be subject to these provisions.
“El Contratista reconoce que 31 U.S.C., Capítulo 38 se aplica a sus acciones relacionadas con este contrato. El Contratista certifica o afirma la veracidad y exactitud de cualquier declaración que haya hecho, haga, pueda hacer o haga que se haga en relación con este contrato. El Contratista acuerda incluir el lenguaje anterior en cada subcontrato bajo este contrato, modificado solo para identificar al subcontratista que estará sujeto a estas disposiciones.”

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9. **Contract Work Hours and Safety Standards Act (APLICA A CONSTRUCCION DE \$100,000 o más)** The Contractor will comply with the contracts work hours and Safety Standard Act (40 USC Sections 3701-3708) as supplemented by the Department of Labor Regulations (29 CFR Part 5).
"El Contratista cumplirá con los contratos de horas de trabajo y la Ley de Normas de Seguridad (40 U.S.C. Secciones 3701-3708) según lo complementado por el Departamento de Regulaciones Laborales (29 CFR "Parte 5")."
10. **Davis-Bacon Act (APLICA A CONSTRUCCION DE \$2,000 o más)** The Contractor agrees to comply with the Davis-Bacon Act (40 U.S.C. & 3141-3148). That establishes the requirement for paying the local prevailing wages on public works projects for laborers and mechanics.
"El Contratista acepta cumplir con la Ley Davis-Bacon (40 U.S.C. y 3141-3148). Eso establece el requisito de pagar los salarios locales vigentes en proyectos de obras públicas para trabajadores y mecánicos."
11. **Copeland Anti-kickback act 40 U.S.C. 3145. (APLICA A CONSTRUCCION DE \$2,000 o más y debe ir acompañada de la cláusula DAVIS BACON ACT)**. The Contractor or Sub-recipient will comply with the Copeland Anti-kickback Act (40 U.S.C. 3145). By this means the Contractor acknowledges and certifies that will not induce any person employed in the construction, completion, or repair of any public work, to give up any part of the compensation to which he or she is otherwise entitled.
"El Contratista o el Sub-receptor cumplirán con la Ley contra el Soborno Copeland (40 U.S.C.3145). Por este medio, el Contratista reconoce y certifica que no inducirá a ninguna persona empleada en la construcción, finalización o reparación de ninguna obra pública a renunciar a ninguna parte de la compensación a la que tiene derecho de otra manera."
12. **Energy Policy and Conservation Act** The Contractor agrees to comply with mandatory standards and policies relating to energy efficiency which are contained in the State Energy Conservation Plan issued in compliance with the Federal Energy Policy and Conservation Act.
"El Contratista acepta cumplir con las normas y políticas obligatorias relacionadas con la eficiencia energética que figuran en el Plan Estatal de Conservación de Energía emitido de conformidad con la Ley Federal de Política y Conservación de Energía."
13. **Seat Belt Use, Executive Order 13043.** In Accordance with the Executive Order No. 13043 the Contractor will enforce Seat Belt use policies and programs for its employees when operating agency cars, rented or personally owned vehicles.
"De acuerdo con la Orden Ejecutiva No. 13043, el Contratista hará cumplir el uso del cinturón de seguridad de las políticas y programas para sus empleados cuando operen automóviles de agencias, vehículos alquilados o de propiedad personal."
14. **Compliance with Federal Law, Regulations and Executive Orders.** The Contractor will comply with all applicable federal laws, regulations and executive orders and National Guard policies, procedures and directives.
"El Contratista cumplirá con todas las leyes, regulaciones y órdenes ejecutivas federales aplicables y las políticas, procedimientos y directivas de la Guardia Nacional."
15. **No Obligation by Federal Government:** The federal government is not a party to this contract and is not subject to any obligations or liabilities to the Agency, contractor, or any other party pertaining to any matter resulting from this contract.
"El gobierno federal no es parte de este contrato y no está sujeto a ninguna obligación o responsabilidades con la Agencia, el contratista o cualquier otra parte relacionada con cualquier asunto resultante de este contrato."

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16. Privacy Act

The Contractor agrees to:

- (1) Comply with the Privacy Act of 1974 (the Act) and the agency rules and regulations issued under the Act in the design, development, or operation of any system of records on individuals to accomplish an agency function when the contract specifically identifies-
 - a. The systems of records; and
 - b. The design, development, or operation work that the contractor is to perform.
 - c. Include the Privacy Act notification contained in this contract in every solicitation and resulting subcontract and in every subcontract awarded without a solicitation, when the work statement in the proposed subcontract requires the redesign, development, or operation of a system of records on individuals that is subject to the Act; and
- (2) Include this clause, including this paragraph,
- (3) in all subcontracts awarded under this contract which requires the design, development, or operation of such a system of records.

In the event of violations of the Act, a civil action may be brought against the agency involved when the violation concerns the design, development, or operation of a system of records on individuals to accomplish an agency function, and criminal penalties may be imposed upon the officers or employees of the agency when the violation concerns the operation of a system of records on individuals to accomplish an agency function. For the purposes of the Act, when the contract is for the operation of a system of records on individuals to accomplish an agency function, the Contractor is an employee of the agency.

"Operation of a system of records," as used in this clause, means performance of any of the activities associated with maintaining the system of records, including the collection, use, and dissemination of records.

"Record," as used in this clause, means any item, collection, or grouping of information about an individual that is maintained by an agency, including, but not limited to, education, financial transactions, medical history, and criminal or employment history and that contains the person's name, or the identifying number, symbol, or other identifying particular assigned to the individual, such as a fingerprint or voiceprint or a photograph.

"System of records on individuals," as used in this clause, means a group of any records under the control of any agency from which information is retrieved by the name of the individual or by some identifying number, symbol, or other identifying assigned to the individual.

"El Contratista acepta:

- (1) *Cumplir con la Ley de Privacidad de 1974 (la Ley) y las reglas y regulaciones de la agencia emitidas bajo la Ley en el diseño, desarrollo u operación de cualquier sistema de registros de individuos para cumplir una función de la agencia cuando el contrato identifica específicamente:*
 - a. *Los sistemas de registros; y*
 - b. *El trabajo de diseño, desarrollo u operación que el contratista debe realizar;*
 - c. *Incluir la notificación de la Ley de Privacidad contenida en este contrato en cada solicitud y subcontracto resultante y en cada subcontracto otorgado sin una solicitud, cuando la declaración de trabajo en el subcontracto propuesto requiera el rediseño, desarrollo u operación de un sistema de registros de individuos que está sujeto a la Ley; e*
- (2) *Incluir esta cláusula, incluido este párrafo,*
- (3) *en todos los subcontratos adjudicados en virtud de este contrato que requiera el diseño, desarrollo u operación de dicho sistema de registros.*

"En caso de violaciones de la Ley, se puede entablar una acción civil contra la agencia involucrada cuando la violación se refiere al diseño, desarrollo u operación de un sistema de registros de individuos para cumplir una función de la agencia, y se pueden imponer sanciones penales a los oficiales o empleados de la agencia cuando la violación se refiere a la operación de un sistema de registros de individuos para cumplir una función de la agencia. Para propósitos de la Ley, cuando el contrato es para la operación de un sistema de registros de individuos para cumplir una función de agencia, el Contratista se considera un empleado de la agencia."

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"Operación de un sistema de registros", como se usa en esta cláusula, significa el desempeño de cualquiera de las actividades asociadas con el mantenimiento del sistema de registros, incluida la recopilación, uso y difusión de registros.

"Registro", como se usa en esta cláusula, significa cualquier elemento, recopilación o agrupación de información sobre un individuo que es mantenida por una agencia, que incluye, entre otros, educación, transacciones financieras, historial médico e historial criminal o laboral y que contiene el nombre de la persona, o el número de identificación, símbolo u otra identificación particular asignada a la persona, como una huella digital o una huella de voz o una fotografía.

"Sistema de registros de individuos", como se usa en esta cláusula, significa un grupo de registros bajo el control de cualquier agencia de la cual se recupera información por el nombre del individuo o por algún número de identificación, símbolo u otro identificador particular asignado al individuo."

17. **Procurement of Recovered Materials: (APLICA A CONTRATOS DE \$10,000 o más)** The Contractor agrees to provide a preference for products and services that conserve natural resources that protect the environment and maximizes energy establishing an affirmative program for procurement of recovered materials identified as EPA guidelines.

"El Contratista acuerda proporcionar una preferencia por los productos y servicios que conservan los recursos naturales que protegen el medio ambiente y maximiza la energía estableciendo un programa afirmativo para la adquisición de materiales recuperados identificados como pautas de la EPA."

18. **Equal Employment Opportunity (EEO)** The Contractor agrees to obey all laws and regulations regarding discrimination for reasons of race, color, gender, natural origin or social condition, sexual orientation, age, political or religious belief or any other discriminatory cause in the provision of services contained in this contract. It will also have the responsibility to avoid creating a hostile environment, free of all types of harassment, to include sexual harassment; having the responsibility of notifying the Executive Officer for State Affairs or the person designated by PRNG immediately of any situation that arises to this effect. Failure to comply in this regard will cause the contract to be terminated without further notice. According to *Executive Order No. 11246, Amendment No. 11375, 41 CFR Part 60, Americans with Disabilities Act of 1990 (ADA) and 2 CFR Part 200.*

"El Contratista acuerda obedecer todas las leyes y regulaciones con respecto a la discriminación por motivos de raza, color, género, origen natural o condición social, orientación sexual, edad, creencias políticas o religiosas o cualquier otra causa discriminatoria en la provisión de servicios contenidos en este contrato. También tendrá la responsabilidad de evitar crear un ambiente hostil, libre de todo tipo de acoso, para incluir el acoso sexual; tener la responsabilidad de notificar al Oficial Ejecutivo de Asuntos del Estado o la persona designada por PRNG de inmediato de cualquier situación que surja a este efecto. El incumplimiento a este respecto hará que el contrato se rescinda sin previo aviso. De acuerdo con la Orden Ejecutiva No. 11246, Enmienda No. 11375, 41 CFR Parte 60, estadounidenses con la Ley Americana de Discapacidades de 1990 (ADA) y 2 CFR Parte 200."

19. **Termination for Cause and Convenience** Any of the parties may rescind the contract at any moment, through written notification to the other party, fifteen (15) days in advance to the date on which the contractual resolution shall be effective. However, the requirement of prior notification will not apply when probable cause for arrest is determined against the Contractor, for any State or Federal crime, and for any of the grounds established in the contract. PRNG will be able to immediately terminate the contract in the event of negligence, abandonment of duties or non- fulfillment of any of the contractual obligations. Non-fulfillment, among other things, will include the Contractor not providing services required by PRNG after having requested them in writing or by any other approved means of communications.

NO services are to be paid for that are in violation to this clause, since it is understood that any official that request and/or accepts services from another part that is in violation to this disposition, is doing so without any

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appropriate legal authority.

“Cualquiera de las partes puede rescindir el contrato en cualquier momento, mediante notificación escrita a la otra parte, con quince (15) días de anticipación a la fecha en que la resolución contractual será efectiva. Sin embargo, el requisito de notificación previa no se aplicará cuando se determine la causa probable del arresto contra el Contratista, por cualquier delito del Estado o Federal y por cualquiera de los motivos establecidos en el contrato. PRNG podrá rescindir inmediatamente el contrato en caso de negligencia, causa probable de arresto contra el Contratista, por cualquier delito del Estado Federal y por cualquiera de los abandonos de funciones o incumplimiento de cualquiera de las obligaciones contractuales. El incumplimiento, entre otras cosas, incluirá que el Contratista no brinde los servicios requeridos por PRNG después de haberlos solicitado por escrito o por cualquier otro medio de comunicación aprobado.

NO se pagarán servicios que infrinjan esta cláusula, ya que se entiende que cualquier funcionario que solicite y/o acepte servicios de otra parte que infrinja esta disposición, lo hará sin ninguna autoridad legal adecuada.”

- 20. Contractual Legal Remedies Controversies and Pertinent Laws:** This contract will be governed by the laws of the Government of Puerto Rico and the United States of America. Should any disposition, cause or part of this contract be contested for any reason before a Court of Law and declared unconstitutional or null, such determination will not affect, undermine, or invalidate the remaining dispositions or clauses of this contract, rather, in its effect will limit only to the disposition declared unconstitutional or null. Both parties accept that the San Juan Superior Court (First Instance) will be the court with pertinent jurisdiction to elucidate any judicial action originating from this contract.

“Este contrato se regirá por las leyes del Gobierno de Puerto Rico y los Estados Unidos de América. Si alguna disposición, causa o parte de este contrato se impugna por algún motivo ante un Tribunal de Justicia y se declara inconstitucional o nulo, dicha determinación no afectará, socavará ni invalidará las disposiciones o cláusulas restantes de este contrato, sino que, en su efecto, limitará solo a la disposición declarada inconstitucional o nula. Ambas partes aceptan que el Tribunal Superior de San Juan (Primera Instancia) será el tribunal con jurisdicción pertinente para dilucidar cualquier acción judicial que se origine en este contrato.”

- 21. Drug Free Work Place** The Contractor certifies that it will maintain a drug free working environment. It also certifies the publication and distribution of material related to the prohibition of controlled substances and the penalties that these are subject to, and that prevention and detection of drug programs have been established. The Contractor will inform PRNG in case of a conviction for drugs in the workplace area and the disciplinary actions that Will be taken against any employee convicted for criminal offenses related to the use and abuse of controlled substances according to the “Drug Free Workplace Act”.

“El Contratista certifica que mantendrá un ambiente de trabajo libre de drogas. También certifica la publicación y distribución de material relacionado con la prohibición de sustancias controladas y las sanciones a las que están sujetas y que se han establecido programas de prevención y detección de drogas. El Contratista informará a PRNG en caso de una condena por drogas en el área de trabajo y las medidas disciplinarias que setomarán contra cualquier empleado condenado por delitos relacionados con el uso y abuso de sustancias controladas de acuerdo con la “Ley de Lugar de Trabajo Libre de Drogas”.

Included by Legal Office Judge Advocate (JAG)

- 22. Police Record Check** The Contractor agrees to submit to a background check prior to providing services to PRNG. The background check will be completed by PRNG and includes a criminal record check, verification against the national sex offenders register and any other verification that deem necessary in relationship with the services to be provided by the Contractor. The background checks must show no convictions or pending criminal charges that would render the Contractor to provide the services requested in the contract.

“El Contratista se compromete a someterse a una verificación de antecedentes antes de prestar servicios a PRNG. La verificación de antecedentes será realizada por la PRNG e incluye una verificación de antecedentes

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GOVERNMENT OF PUERTO RICO

Puerto Rico National Guard

penales, verificación contra el registro nacional de ofensores sexuales y cualquier otra verificación que se considere necesaria con relación a los servicios que brindará el Contratista. Las verificaciones de antecedentes deben mostrar no condenas o cargos penales pendientes que harían que el Contratista no pueda brindar los servicios solicitados en el Contrato”.

23. **Annual Threat Awareness and Reporting Program (TARP) Training** All Contractor's Employee will complete an annual Threat Awareness and Reporting Program (TARP) training provided by a Counterintelligence Agent, IAW (DoDD 5240.06 Counterintelligence Awareness and Reporting). The Contractor shall submit the certificates of completion of the training for each employee or a memorandum for record to the COR or Contracting Officer (if a COR is not assigned), within five (5) calendar days after completion of the training.

"Todos los Empleados del Contratista completaran una capacitación anual del Programa de Informes y Concientización sobre Amenazas (TARP) brindada por un Agente de Contrainteligencia, IAW "(DoDD 5240.06 Counterintelligence Awareness and Reporting). El Contratista deberá presentar los certificados de finalización de la capacitación para cada empleado o un memorando para su registro al COR o al Oficial de Contrataciones (si no se asigna un COR), dentro de los cinco (5) días calendario posteriores a la finalización de la capacitación."

We certify that we will comply with the clauses and conditions established by the laws and regulations.

Certificamos que cumpliremos con las cláusulas y condiciones establecidas por las leyes y reglamentos antes mencionados.

Compañía

Nombre

Firma

Puesto que Ocupa

Sello Corporativo de la Compañía

Attachment 4

IMPERATIVE INCLUSION CLAUSES

OGP Circular Letter 2021 – 13. In accordance with OGP Circular Letter 2021 – 13, all professional services contracts valued over \$250,000.00 are to include the following clauses.

Contract Review Policy of the Fiscal Oversight and Management Board of Puerto Rico: The Parties acknowledge that the CONTRACTOR has submitted the certification titled "Contractor Certification Requirement" required in accordance with the Fiscal Oversight and Management Board of Puerto Rico, effective as of November 6, 2017 and as amended on October 30, 2020, signed by the Contractor's Executive Director (or another official with an equivalent position or authority to issue such certifications).

At the time of signing this contract, the Contractor, maintains a current contractual relationship with the following entities of the Government of Puerto Rico: [Entity # 1; Entity # 2, and Entity # 3]. The Contractor certifies that the aforementioned are all entities of the Government of Puerto Rico with which it has a contractual relationship. In addition, the Contractor recognizes and accepts that failing to mention any governmental entity, with which it has a current contractual relationship, may result in the termination of this contract if required by the Agency.

The Agency certifies that the Contractor was selected as the provider of the professional services described in this contract in accordance with the provisions in Executive Order 2021-029. Likewise, both parties certify that they are aware of the provisions of said Executive Order and Circular Letter and that any contract covered by it that has not followed the processes and requirements established therein will be terminated.

At the time of signing this contract, The Contractor certifies that it is a public corporation duly registered and authorized to issue shares. The Contractor certifies that the shares issued in its name and in circulation are exchanged in a duly regulated stock exchange.

Non corporate: At the time of signing this contract, the Contractor certifies that it is not a public corporation with shares exchanged in a duly regulated stock exchange. The Contractor certifies that prior to signing this contract it has completed the Certification on Legal Persons and has provided it to the Agency.

Name of Contractor's authorized representative

Date

Signature of Contractor's authorized representative

**CLÁUSULAS DE INCLUSIÓN IMPERATIVA EN TODO CONTRATO DE
SERVICIOS PROFESIONALES O COMPRADOS (Carta Circular 001-2021)**

Todos los contratos de servicios profesionales o comprados cuya cuantía exceda diez mil dólares (\$10,000) deberán contener textualmente las siguientes cláusulas:

- a. Cláusula de servicios interagenciales: Ambas partes contratantes reconocen y acceden a que los servicios contratados podrán ser brindados a cualquier entidad de la Rama Ejecutiva con la cual la entidad contratante realice el acuerdo interagencial o por disposición directa de la Secretaría de la Gobernación. Estos servicios se realizarán bajo los mismos términos y condiciones en cuanto a horas de trabajo y compensación consignados en este contrato. Para efectos de esta cláusula, el término entidad de la Rama Ejecutiva incluye a todas las agencias del Gobierno de Puerto Rico, así como a las instrumentalidades y corporaciones públicas y a la Oficina del Gobernador.
- b. Cláusula de terminación: La Secretaría de la Gobernación tendrá la facultad para dar por terminado el presente contrato en cualquier momento.
- c. Política de Revisión de Contratos de la Junta de Supervisión y Administración Financiera para Puerto Rico: Las Partes reconocen que el CONTRATISTA ha presentado la certificación titulada "Requisito de Certificación del Contratista, requerida de conformidad con la Política de Revisión de Contratos de la Junta de Supervisión y Administración Financiera para Puerto Rico, vigente a partir del 6 de noviembre de 2017 y según enmendada el 30 de octubre de 2020, firmada por el Director Ejecutivo del Contratista (u otro funcionario con una posición o autoridad equivalente para emitir tales certificaciones). Se incluye como anejo a este Contrato, copia firmada del "Requisito de Certificación del Contratista".

Nombre del Representante Autorizado del Contratista

Fecha

Firma del Representante Autorizado del Contratista